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A Glance at the Contents—

Gas Lighting in Spenborough.

After much opposition on the part of the champions of electricity and a plethora of meetings on the subject, the Spenborough Town Council have finally decided to accept the recommendations put forward by the Gas Department for the all-round improvement of the public lighting in the district.

Mr. W. Buckley's Presidential Address.

The Presidential Address of Mr. W. Buckley, of Tralee, before the Irish Association of Gas Managers, at their annual meeting in Dublin, commences in historic strain, telling of fifty years' progress of the gas industry in the spheres of lighting, heating, and cooking. He goes on to give some comparisons between gas and electricity, and cites facts on public lighting.

Rapid Water Heating by Gas.

Described on pages of this issue, and illustrated by photographs, is a water heating installation by Messrs. Thomas Potterton, Ltd., of Balham, at the sports pavilion erected at Lower Sydenham for the staff of the Employers' Liability Assurance Corporation, Ltd. There is available throughout the pavilion a copious supply of hot water on the "Victor" storage system, the boiler plant having an output of 246,000 B.Th.U. per hour.

A Tri-Lingual Technical Dictionary.

A short note appears later on a tri-lingual dictionary which is published in Berlin at 15s. The work is divided into three sections—German-English-Italian, English-German-Italian, and Italian-German-English. It covers technical terms in general, and is not confined to any one industry. A large number of words familiar in gas-works practice are to be found, and a valuable feature is the rendering of compound words and phrases into their foreign equivalents.

Use of Crude Liquor as a Fertilizer.

As time goes on, it becomes more and more difficult for gas undertakings to find an outlet—profitable or otherwise—for their ammonia, whether as crude liquor, concentrate, sulphate, or chloride. An article on later pages to-day, by K. H. Raupp, explains the procedure in Görlitz, where the local gas undertaking invited farmers to undertake, without expense to themselves, experiments with crude liquor. The results of these trials show clearly the advantages gained in better crops by the application of nitrogen in this form.

Tariffs and the Extension of Gas Sales.

We describe the comprehensive investigation made in Germany by a small undertaking with a view to extending gas sales and turning unremunerative into remunerative consumers. The profitable development of gas sales, states the author, Mr. A. Schëfer, involves an exhaustive analytical survey of the whole district covered by an undertaking. Such a survey is not to be made once only, but should be continually in progress. The tariffs finally introduced, after such an investigation, are then explained.

Sale of Coal Under Specification.

In a paper before the World Power Conference in Berlin last June, R. A. Burrows and N. Simpkin dealt with the progress of scientific buying of coal in recent years. This has been accelerated, state the authors, by the growth of large combines and corporations, which, by reason of their size, have found it worth while to establish a buying department with a technical staff. The expense of sampling and testing consignments of coal is infinitesimal compared with the value of the commodity, and the cost of carrying out such work should not deter anyone from instituting regular tests.

Gas in Industry.

Mr. J. E. White, of Newcastle-upon-Tyne, dealing with the employment of gas in the engineering trades, observes that profits can be made or lost in the core room of a foundry; and an important phase in the process is the baking or drying of cores. The core room is often the most neglected part of a foundry, and yet improperly baked cores can cause enormous losses through defective castings. Surface faults will occur in the most perfect casting made if the core is poor, and not infrequently of such magnitude that the liberal machining allowance is quite insufficient to remove them, with the inevitable result of a scrapped casting, or, at the best, the production of a very inferior article. Such engineers as Sir W. R. Morris have realized the value of gas in this operation, and those who have seen the conveyor drying ovens in the Morris foundry will agree with the statement in one of the Morris publications that "the town gas drying of cores is considered by most British foundries to be both economical and desirable where the price of gas is at all reasonable. Once installed, labour is eliminated so far as fuel is concerned."

Even small works have now to determine the calorific value of their gas at frequent intervals. We would remind our readers that they can obtain from the "JOURNAL" Offices the Labour-saving B.Th.U. Calculator which was designed by the late Mr. H. J. Hailstone. This neat device, which is for use in conjunction with the Boys Calorimeter, not only saves time and trouble, but ensures constant accuracy. It was illustrated on p. 324 of the "JOURNAL" for Aug. 6.

EDITORIAL NOTES

In Retrospect: And To-Day

THE Presidential Address which Mr. W. Buckley, of Tralee, delivered yesterday before the Irish Association, and which will be found on later pages of this issue of the "JOURNAL," really divides itself into two portions, one of which is a historical review of the progress of the gas industry generally, with particular reference to Ireland, and the other a vivid impression of the Irish gas industry as it exists to-day. In regard to the latter phase Mr. Buckley shows himself to be no shirker of facts and yet, in spite of—or is it because of?—these facts no pessimist. There is a general idea, he says, that electricity can be produced from nothing at all. Water-power schemes, such as the Shannon, give rise to this notion; and it is not considered worth while to ponder on the fact that this water-power can only be harnessed by spending vast sums of money which must necessarily be reflected in the price of electrical energy to the consumer. And where electricity most abounds, in the United States, gas is flourishing exceedingly and is becoming more popular every year. In the States one does not hear the nonsense talked about gas and electricity which is all too common in both England and Ireland; and neither of the latter countries is anything like gas-saturated. We are a long way from saturation-point. We have much progress to effect; but we can effect this progress if we determinedly face the situation created by alert competition from electricity—competition which must be viewed sanely, without any attempt to minimize it, but which need not cast a cloud of gloom over us.

Mr. Buckley pauses to consider the progress of the gas industry in Ireland during the past fourteen years, and he cites the following statistics: Six gas-works producing over 100 million c.ft. per annum show an increase of 51 p.ct.; works producing 50 to 100 millions, 21 p.ct.; thirteen works producing from 20 to 50 millions, 13 p.ct.; fourteen smaller works from 10 to 20 millions, 20 p.ct.; and fifteen works from 6 to 10 millions, 5·7 p.ct. This has been during a period which cannot be described as halcyon, though it must be admitted that electrical competition has only of recent years acquired such power in Ireland. It is going to be particularly difficult to retain the domestic lighting load in Ireland. Ground has already been lost; but, like Mr. Buckley, we doubt whether so much inroad would have been made by electricity had it not been for our indifference to the demands of our consumers for convenient, as well as cheap, lighting, and if we had not patted ourselves on the back that what we lost on the swings we should gain on the roundabouts—the former representing the lighting load, and the latter the cooking and heating load. There can be no apathy to-day, however, and the best weapon we can use in regard to domestic lighting is the switch. Halifax, by the way, is installing eighty gas switches every week as a result of an intensive campaign to retain the lighting load. As for public lighting, since the beginning of this century gas has shown an increase of over 51 p.ct.; and with such examples before us as Lewisham and Deptford, there is no reason why this increase should not continue.

Many will probably share our view that one of the most interesting sections of Mr. Buckley's historical review of the gas industry is the one concerning the work of Mr. T. Travers, of Cork, in the 'seventies, when he made arrangements that outside gasfitters were not permitted to connect stoves unless they used the correct size of piping and proper methods. At that time in Cork they had a stove inspector whose duty it was to instruct consumers and ensure that the appliances installed were functioning well and giving satisfaction; and they also had a showroom where appliances could be seen in operation. Here, too, there was a permanent exhibition of burners, good and bad, so that consumers could see for themselves the advisability of discarding inferior fittings. "It is astonishing," observes Mr. Buckley, "to reflect that Travers was so fully alive to the necessity for maintenance in order to secure the absolute satisfaction of his consumers. When I look around to-day, fifty years later, and see the number of undertakings without showrooms, efficient salesmen, and effective schemes of maintenance, I feel ashamed. We are still more or less talking about it. We need to get down to the problem and wear down the mistaken opposition of those on whom we rely to supply us with the money to inaugurate and maintain showrooms, salesmen, and maintenance staff." We hope that the gas undertakings to which Mr. Buckley refers will take his remarks to heart, and, having done so, will act quickly. Then—to use Mr. Buckley's words—there will be no need to be disheartened or dismayed, even if all the floodgates of the Shannon are thrown open to deluge the gas industry of Ireland.

Ammoniacal Liquor as Fertilizer

WRITING in "Das Gas- und Wasserfach," K. H. Raupp, of Görlitz, queries whether there is a single gas-works whose ammonia plant is not showing a debit balance. Though we cannot subscribe to this observation, we do know that few sulphate plants in this country are running at a profit; hence our interest in the article mentioned, a translation of which is published in our columns to-day. Mr. Raupp envisages no reasonably early solution to the problem other than that the industry should pass its crude liquor on to agriculture. The question is, of course, will the agriculturist have it, or, having employed it for some years, will he continue to use it? To the first question, the author gives a definite answer; to the second, there is as yet no complete answer, though it is a fact that for at least twenty years in Germany several gas-works have disposed of their make of crude liquor to farmers. The reason why there can be no ready reply to the second question is that we do not yet know whether the continuous use of crude liquor may cause an eventual extermination of bacteria which are necessary in the soil to promote plant life. At present we have to content ourselves with the knowledge that no such damage can be traced in the early years of its correct application.

It is on its correct application that we would dwell for a moment or two, for we think that several hasty conclusions have been drawn as the result of the incorrect use of crude liquor as a fertilizer. Badly employed, ammoniacal liquor is a danger to the farmer; and it must be remembered that the modern farmer has at his disposal not only scientific training, but advisory associations of all kinds. Hence it is of no avail simply to say to a farmer, "Use our liquor;" we must tell him very precisely how to use it, for careful precautions are essential if it is going to be efficacious. There are phenols, sulphuretted hydrogen, cyanogen, pyridine bases, and naphthalene in gas liquor; and it is certain that phenols, pyridine bases, and naphthalene are plant poisons of a virulent nature. It is possible, however, to obtain with crude liquor results comparable with those obtained from sulphate provided that the action of air, water, and other substances in the soil is allowed to take place sufficiently long to transform these poisons into innocuous compounds. In other words, application of liquor to the soil must precede by several weeks the time when the fertilizing action is required.

In Germany the farmers fetch the liquor from the gas-works; and if they do not employ it on the land at once they either add it to a liquid manure sump or use it for making a top-dressing. It is in its direct application to the land, however, that we are now concerned; and in this connection Mr. Raupp's observations may be reinforced by the instructions of M. Paturel, Director of the Saône-et-Loire Agricultural Station, published in the "JOURNAL" a short time ago. M. Paturel says that undiluted liquor can only be used on fallow land and when the weather is hot. The immediate effect is the destruction of weeds, and the soil can then be turned to incor-

porate the fertilizer. Otherwise, the liquor must be diluted with once or twice its volume of water; and the application should be made when the weather is dull and humid, and preferably when it is raining. The spraying must take place several weeks before sowing, and rain must intervene between the operations. M. Paturel stresses the merits of liquor as an insecticide; while Mr. Raupp gives some highly valuable results of its application to various crops, which results he compares with those obtained by equivalent manuring with Leuna saltpetre. In regard to the marketing of the liquor, Mr. Raupp emphasizes the importance of declaring its exact strength and the degree of dilution required; and he suggests that it might be a good plan to offer the liquor on a six-months' free trial.

Scientific Coal Purchase

A CLOSELY reasoned analysis of the present situation in regard to the purchase of coal to specification is given in later columns of this issue of the "JOURNAL" by Mr. R. A. Burrows and Mr. N. Simpkin, whose names are well known to many of our readers. Their contribution is an abstract of a paper which they prepared for the World Power Conference in Berlin last June. The whole question has been discussed frequently of late among several technical societies and organizations; and the views expressed indicate that indifference to the purchase of coal on a scientific basis is in part due to the fact that until recently chemists have had considerable difficulty in determining the composition of the variety of substances termed "coal," and in part to the difficulty of devising satisfactory methods of sampling. The greatest objection to the system of scientific selling, however, probably is that in many instances in this country in the past proposed contracts have been one-sided—they have been drawn up with the idea of benefiting the consumer only. It is obvious that, when dealing with a raw material like coal, which is subject to variations even when the greatest care is taken to exclude impurities, the basis of agreement must permit of a certain amount of elasticity. As the authors of the contribution under review observe, knowing that the buyer now sets up a standard in nearly every case, it is to the advantage of the seller that the standard so established should be one to which he is a party; and any sliding-scale contract based on one or other of the existing methods of evaluation should contain provision for bonuses as well as penalties, so that improvement in quality may be rewarded, and deterioration penalized.

In spite of a marked improvement in recent years, the buyer of coal is much in advance of the producer in the matter of testing, and there remains no general practical relation between the collieries tests and the consumers' tests. The present trend of affairs in the coal industry will, however, we suggest, rapidly tend to eliminate this difficulty. As far as the gas industry is concerned, there can be no doubt that buying under specification would be advantageous. The trouble, of course, is to know how to base any contract which is to be of real value. An ash content, or moisture content, or calorific value content basis, or a combination of these, is insufficient, though low ash and moisture are obviously desirable. There are many conflicting elements which must be balanced in relation not only to the price at which coal may be purchased, and the amount of gas which it will make in a particular carbonizing system, but also to the condition of the residuals market at any one time, and the need for maintaining a supply of solid smokeless fuel of satisfactory and unvarying quality. And, as we remarked in these columns a short time ago, cheap coal is expensive if dearer coal would yield a better return from the setting in use. This is obvious, but the difficulty arises in arriving at a conclusion as to what is, and what is not, economical coal. Proximate analysis affords little guide to the gas engineer; it allows of the valuation of the ash content and the moisture content, but it gives no clue as to how the volatile matter will be distributed in the products when the coal is carbonized. Hence our insistence that large-scale working tests should be carried out by purchasers before any specification is drawn up on any contract entered into. Laboratory tests may then act as guidance that the quality of the coal is being maintained.

It is upon these laboratory tests that we would once again, like Messrs. Burrows and Simpkin, emphasize the importance of proper sampling. The duty of obtaining samples is not infrequently placed in the hands of an operator who does not fully appreciate what he has to do; and however conscientious he may be, he fails in his work through lack of instruction. The authors suggest, therefore, that if the actual method of sampling is not included in the terms of the contract, there should be a definite understanding between the contracting parties as to the method to be adopted. In this connection, automatic coal samplers, which eliminate much of the uncertainty of hand sampling and quartering, are available. It is well known that the difficulties of mixing are great when the particles vary much in size, as they do during the stage-to-stage method of reduction; and consequently there are many chances of introducing errors in the usual hand method of repeated quartering. We would remind our readers that just a year ago (Aug. 14, 1929, to be precise) we described and illustrated a mechanical coal sampler which comprises two simply constructed mechanical riffles—one for the coal as it flows from the crusher; the other for dividing the reduced sample after it has been ground to pass 1/20-in. sieve. The contribution by Messrs. Burrows and Simpkin will, we are sure, be widely studied; and particular attention will doubtless be paid to the reasons, set out by the authors, why in Great Britain there has been, and still is, a general disinclination on the part of both buyer and seller to draw up a specification to form the basis of a contract.

Much Needed Protection

THE City has lately produced many features, but pleasant ones have been few and far between. The investor receives his almost daily douche, to remind him of the proportions of the depression through which the country —not alone, be it said at once—is passing. Such trade and industrial conditions as are evidenced on every hand must have effects which no one can escape. But the investor may be pardoned should he think that he ought to have been spared certain "effects" upon him produced by other causes. Not alone, too, has he suffered from these "other causes." What must the loss have been already to those on the Stock Exchange and others professionally engaged in the City through the shocks which certain forms of company promoting and finance have given to public confidence. Some part of what happened to give rise to these shocks should have been prevented; and for a long time to come there will be widespread regrets that it was not.

But perhaps the investor will take heart from a report of the Stock Exchange Special Sub-Committee on New Issues and Official Quotations, which, we learn from a contemporary, members unanimously feel "will go far towards preventing fraud, and will operate to the benefit of the investing public." The full report was published in the "Financial Times" on Aug. 13, and to the document we must refer readers who are wishful to know exactly what has been done. In view, however, of the fact that the Stock Exchange is looked to by investors to afford them protection, and of the further fact that there has been a feeling that the rules hitherto have not been sufficiently stringent, it is only right that there should be due acknowledgment of this effort to make harder the path of the undesirable company promoter.

The Core of Commerce—

"Salesmanship" was the subject of a paper by Sir Francis Goodenough at the Drapers' Chamber of Trade Summer School at Cambridge. Salesmanship, said Sir Francis, which he characterized as the "very core of commerce," if it is to eventuate in permanent profitable trade, must begin in the boardroom, continue in the office, control the factory and transport organization, and persist in service after sale. The selling policy of a firm determines its success or its failure. The first principle is that every business exists for the service

of the community in general and the individual customer in particular, and that business relations can only be permanently profitable to the seller if they are also profitable to the buyer. This principle can be expressed as a motto in the words "Service First." The mind, the habits, and the needs of the customer must be the constant and sympathetic study of those wishing to serve him. Sir Francis went on to say that he regarded the treatment of complaints as the acid test of salesmanship. If the complaining customer was regarded at best as a nuisance, at worst as an enemy, and certainly as a vexation, there was something radically wrong with the policy of the firm. Every complaint, if it was to result in the ultimate satisfaction of the customer, must be regarded, at any rate in the first instance, as being probably well founded. In his experience of over twenty years in dealing with customers of all ranks—they now numbered well over 1,000,000—complaints were very rarely entirely unfounded.

And Cores for Casting.

Thinking of cores reminds us of an article by Mr. H. L. Campbell, of Michigan University, which has been published in "Industrial Gas." In that article the author considers the use of gas, coke, oil, and electricity for heating core ovens. A more uniform distribution of heat can be obtained throughout a core oven by a moving atmosphere heated by gas than by stationary radiant heat from electrical resistance units mounted within the oven. After considering the requirements of core baking and the characteristics of the different fuels which may be used, Mr. Campbell observes that gas is most advatageous for this application. The relatively low temperatures most favourable for baking cores can be obtained more economically. Other advantages are simple and accurate control of temperature and atmosphere within core ovens, as well as the possibility of well regulated heat distribution, which permit the standardization of the baking process and ensure production of cores with uniformly physical properties.

About Gasholders—

Conspicuous though they are as an accomplished fact denoting the continued progression of a great industry, gasholders perform their mission in industrial and domestic life so efficiently and silently as to draw to themselves little notice from the general Press. An exception is provided by the "Yorkshire Post," which, in its editorial columns, under the heading "Gasometers and Petrol Pumps," has heartily endorsed the "Co-Partnership Journal" of the South Metropolitan Gas Company in asserting—as has already been mentioned in the "JOURNAL"—that the gasholder is "an honest dignified solution of a worthy purpose," and "is built with that essential economy of material by which the engineer almost unconsciously produces pleasing line and form." This tribute by support is all the more welcome because it is preceded by the opening sentence "It was high time that the gasometer found someone to say a good word for its appearance." The "Yorkshire Post" proceeds to put the gasholder in rational focus, and in such pretty phrasing that we can forgive its use of the expression "gasometer," which term for about a century has been a misnomer, and should occupy a place only in antiquarian gas literature. The "Yorkshire Post" says: "For more than sixty years the gasometer has been the butt of those whose sensitive souls are wounded by industrialism in all its forms. It may not be full of grace or beauty; often it might be painted in a gayer colour. But, considered dispassionately, the gasometer does stand up, a simple dignified mass, serving an honest purpose." Then the "Post" passes on to say that "gasometers" have yielded as favourite target to petrol pumps and the arterial road, which form the remainder of the article, and with which we have here no concern. For its clarity of thinking and independence of action the "Yorkshire Post" has a national reputation. Here is the closing sentence of the article: "This is the age of the engineer; and the engineer provides much of the beauty around us to-day, and will surely provide most of it in the future."

And Accidents.

From what has appeared in the Press, it would seem that in some features the accident to the gasholder at Keighley on July 29—which was illustrated in the "JOURNAL" for Aug. 6—resembles that at Manchester on Aug. 23, 1927, the extensive inquiry into which will be fresh in the minds of "JOURNAL" readers. The conclusions then reached as to the cause or causes were held by some to be conjectural rather than conclusive. Investigation of the Keighley accident would seem to offer an opportunity for confirming or modifying the conclusions reached on the Manchester case. Liability to a new risk to which gasholders may be subject is indicated by a news item from Chicago. It is reported that a fortnight ago two women passengers and a pilot fell with an aeroplane "to the bottom of a huge gas tank." The report states that "the aeroplane was apparently struck by lightning, and crashed through the thin metal roof of the tank." We await with interest further details of this calamity, which evidently refers to a gasholder rather than a "gas tank." Great efforts are being made in this country to boost flying as a means of transport for civilians piloted by themselves. Does it portend that at some future date gas engineers of the period will regard a superstructure protecting the crowns from things falling from above as a necessity in "safety first" gasholder construction?

Gasholder Inspection.

In the Annual Report of the Chief Inspector of Factories and Workshops for the year 1929, attention is directed by the Senior Engineering Inspector to a field of inquiry which might be undertaken advantageously with the object of determining the possibility of securing standards for the testing and inspection of vessels which have to withstand comparatively low internal pressure. Particular reference is made to the unfortunate accident at Manchester when two gasholders were wrecked and considerable damage done. It is suggested that the regular inspection of gasholders (which, it is admitted in the report, is carried out by the works engineers or by representatives of the makers in many instances) would do much to obviate such occurrences. That the subject does not lend itself to uniform treatment is evident; and it will be interesting to learn the results which will accrue from a further consideration of the matter, which, it is understood, is taking place with representatives of the gas industry. Useful comment is made on the subject of the deterioration of gasholders, and, as a result of facts emerging from the inspections which have already taken place, it is emphasized that the age of the holder is not necessarily the most important factor in this respect. The primary consideration would appear to be the material of which the holders are constructed.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Sept. 8-11.—ASSOCIATION OF PUBLIC LIGHTING ENGINEERS.—Annual Meeting and Conference at Leicester.

Sept. 9.—FEDERATION OF GAS EMPLOYERS.—Meeting of the Central Committee.

Sept. 9.—NATIONAL GAS COUNCIL.—Meeting of the Central Executive Board.

Sept. 11.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting at Aberdeen.

Sept. 18.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—General Meeting at Porthcawl.

Sept. 18.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council Meeting in the afternoon.

Sept. 26-28.—NATIONAL SMOKE ABATEMENT SOCIETY.—Annual Conference at Leicester.

Oct. 10.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—Visit to the Manchester Corporation Gas-Works at Partington.

Oct. 22-23.—INSTITUTE OF FUEL.—Annual Conference at the Institution of Electrical Engineers, Victoria Embankment, W.C. 2. Annual dinner at the Connaught Rooms, Great Queen Street, W.C. 2, on Oct. 22.

Oct. 27 to 29.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Meeting at Hull and Bridlington.

Nov. 19.—SOCIETY OF BRITISH GAS INDUSTRIES.—Autumn General Meeting in London, under the Presidency of the Right Hon. Lord Eustace Percy, M.P.

Nov. 25-26.—INSTITUTION OF GAS ENGINEERS.—Autumn Meeting at the Incorporated Accountants' Hall, Victoria Embankment, W.C. 2.

PERSONAL

Mr. R. W. HEWITT, A.C.A., has been appointed Secretary-Accountant of the Portsmouth Gas Company, and will take up his new duties on Oct. 1 next. Mr. Hewitt is a native of Coventry, and was articled to Messrs. E. T. Peirson & Sons, Chartered Accountants, of that City and London. While on the staff of that firm he had considerable experience in the Midlands, Eastern Counties, and London, and qualified as a Chartered Accountant, obtaining the Quilter Prize in the Final Examination for Auditing and Organization Work. In 1919 he joined the South Wales staff of Messrs. Deloitte, Plender, Griffiths, and Co., Chartered Accountants, and carried out important auditing, taxation, and organization work in connection with collieries, steel works, docks, and gas undertakings. For the past four years Mr. Hewitt has held the appointment of Secretary and Accountant to the Whitecross Company, Ltd., Warrington, an old-established and well-known Company manufacturing steel, wire, and copper products, including colliery, shipping, and lift ropes, netting, &c., and having over 1500 employees.

Mr. F. D. MARSHALL'S new address is: Iddesleigh House, Caxton Street, Westminster, S.W. 1.

OBITUARY

The death has taken place of Mr. WILLIAM BROWN, of Abercromby Place, Stirling, a Director of Stirling Gas Light Company.

CORRESPONDENCE

Gas Fire Campaign.

SIR,—The opening of the columns of the "JOURNAL" for the discussion of this subject is very opportune, and the letters which have appeared, particularly that of Mr. J. H. Brearley, are valuable contributions to what is undoubtedly a matter of outstanding importance. It is realized more and more by those who have the management of gas undertakings that it is no use to wait for business to develop itself, but that it must be sought after and even fought for where competition is keen. When the electricity supply is owned by the municipal authority, as in our case, a great deal of propaganda work is carried out, and special terms are offered to consumers of current if they adopt electric heating. In the endeavour to combat this we regularly circulate the excellent literature published by the "B.C.G.A.," hold showroom demonstrations, and organize house-to-house canvassing, all good in their way; but when all is said and done in this direction, it is not enough. In my opinion the problem resolves itself into three terms: (1) Easy and simple conditions for installation; (2) design and efficiency of the heater; and (3) free inspection and maintenance.

In following this procedure we have secured a considerable degree of success. Much of the prejudice against the gas fire has been caused by bad and improper fixing. It is not uncommon for a consumer to purchase a nice-looking fire from a trade list or at an exhibition, without consulting the gas company, and then send to a plumber or local ironmonger to have it fixed. The result is often disastrous. The fire has been fixed without any regard to appearance and without any attempt to secure proper ventilation; it looks depressing and smells badly, and very soon it is proclaimed among friends and neighbours that the thing is not a success and by no means a thing to desire.

All this before the gas company is even aware that a fire has been thought of. Difficulties of this nature are reduced to a minimum when the gas company has the confidence of the consumers; and this is largely secured by the attention and personality of the executive staff. To return to the practical solution of the question, it may be of interest to sketch in detail the method adopted at Basingstoke in applying the three principles of administration referred to above.

Easy and Simple Conditions of Installation.—It has been our practice to fix gas fires not on simple hire, but on short term hire-purchase with £1 or 25 p.ct. of the sale price as deposit, and the remainder in quarterly payments spread over two years. A simple form of agreement is used without legal phraseology or formal wording.

Design and Efficiency of the Heater.—There is now a wide range of gas fires of beautiful design and excellent finish and general efficiency in working, suitable in size and character for any well-appointed house or establishment; and it is in this connection that the consumer often needs some guidance in making a selection, and where, too, the advice of the gas company's representative can be of the utmost service. As before stated, no matter how suitable a gas fire may be for any position, it will not be a success unless it is fitted well, with due care as to neatness, safety, and particularly with precaution against the products of combustion getting into the room. The plan which we use in Basingstoke to prevent this is to close the front of the coal fire grate by means of sheet iron or other suitable material such as asbestos slate fixed as near the bars as possible; or, where these are movable, we take them away. The sheet iron is cut to fit the bead of the register, so as to make a neat flat front against which the gas fire will stand. A suitable hole is cut in the sheet iron to allow the flue nozzle to enter, and, by so doing, especially with the Radiation "injector" type of fire, the products of combustion are carried away and the ventilation of the room is greatly assisted. For many years we have fixed all gas fires in this way; and it is very rare that we get a complaint either of smell or down-draught, and the method certainly makes a better finish and is more like a fixture than a temporary attachment.

The preceding observations refer to fixed fires, but the "portable" heater is unquestionably of greater value in meeting the competition of the electric radiator. To quote Mr. Brearley, "Portability is the greatest weapon of attack." Two years ago we introduced a portable gas heater of the Welsbach "Handiheater" type, fixed with flexible tube and safety connection. The result so far has quite justified the experiment, and has met to some extent the clamour for a portable heater. To meet the competition which we have locally, and to attract the small householder who will not, or cannot, afford a fixed gas fire, we put these portable heaters on simple hire at 5s. a year, paid in two instalments of 2s. 6d. To assist "portability," we lay additional points in other rooms at a slight charge extra to the hire, with interchangeable union or plug-in connection. Care is taken to instruct the consumer in lighting the heater and in its general management; moreover, only 6 ft. of flexible tubing is supplied with each heater, to avoid unnecessary coils about the room. There is at present a good opportunity for manufacturers to place on the market a really good portable gas fire or heater constructed on the Kern burner principle, made of sheet metal of attractive appearance, preferably round or half-round, easy to move about, and at a moderate price.

Free Inspection and Maintenance.—Often the gas fire is not used from one season to another; and no matter how clean and careful the housekeeper may be, there is bound to be an accumulation of fluff and dust beneath the fire or in the flue. The air-mixing chamber of the burner is choked, and the fuel is cracked or damaged in some way, so that when the fire is needed in a hurry, in case of illness or on the first cold snap of the autumn an attempt to use results in a nasty smell in the room; or it will not burn at all. In the case of a sick-room, this has a very bad effect; the patient is distressed, and the doctor orders the fire to be removed, and forthwith condemns gas fires in that house and in others he may visit.

Nothing, therefore, would seem to be more important than to see that the gas fire is ever and always in a condition to be used with safety and comfort; and this can only be secured by regular and systematic inspection and careful maintenance.

For the last four years in Basingstoke the system for gas fire inspection and maintenance has been as follows: At the beginning of October in each year a simple form is sent to each consumer stating that the Company will, free of charge, examine any gas fire whether supplied by them or not; and clean, adjust, and put the fires in proper condition ready for the ensuing winter months. Consumers wishing to avail themselves of this service are asked to state on the form the number of fires installed, and return it to the Gas Office. The work is then proceeded with, so that by the end of October most of the fires have been attended to and complaints reduced to a minimum. It is important that this work should be entrusted to intelligent men who know their job and who also know how to present the value of gas for domestic uses, and to be on the look-out for additional installations in other rooms where this is possible.

Propaganda of this nature is worth much. Moreover, the consumer now realizes that the Company is interested in the success of heating by gas; and as the service rendered is free of cost, consumers are not backward in reporting any adjustments required to their gas fires between the periodic maintenance. The main cost of this service is labour, as we have found that the new fuel required after the first year has worked out to an average of two pieces per fire over the total number cleaned. It will be seen that by this method a direct communication between the Company and the consumer is kept, and that the keeping of a census of the number and age of the fires in operation becomes quite a simple matter.

The above particulars are submitted not as original conceptions, but with a view to their being useful to others, and as a small contribution to the subject under review.

HERBERT C. HIGGS,
Secretary and Engineer.

Basingstoke Gas Company,
Basing Road, Basingstoke,
Aug. 18, 1930.

THE NEWS OF THE WEEK

The North British Association will hold their annual meeting on Sept. 11 at the Cowdray Hall (not the Marischal College), Aberdeen.

Dividends are Announced by the South Shields Gas Company for the half-year ended June 30 at the following rates: On the consolidated stock, 4¼ p.c.; on the new stock, 4¼ p.c.; and on the ordinary stock, 2⅞ p.c.—all *less* income-tax.

Hire-Purchase of Cookers has been suggested by Mr. T. R. Cook, the Rotherham Gas Engineer, instead of simple hiring at quarterly rates, which, he says, has been most expensive to the Department. He suggests a hire-purchase charge of 8d. in the £ per quarter. The Committee and the Council have approved of the scheme, and it is to be adopted for an experimental period of three months. There will be no alteration of existing simple-hire rates for cookers already fixed on consumers' premises.

The Wolverton (Bucks) Gas Undertaking, which is owned by the London Midland and Scottish Railway Company, supplies a population of about 14,000, more than 5000 of which are employed at the Carriage and Wagon Works of the Company. The gas-works has largely been remodelled, and a new gasholder of 220,000 c.ft. capacity is now in course of erection by Firth Blakeley, Sons, & Co., Ltd., of Vulcan Ironworks, Church Fenton Leeds. This is being equipped with their patent "Vulcan" ball-thrust spiral carriages. For the New Bradwell area, which is served by the Company from the Wolverton Works, a district supply holder has been decided upon as against the original proposals for boosting, and Messrs. Firth Blakeleys have also this under construction.

A Correction is made by the contributor of the résumé, which appeared in last week's issue of the "JOURNAL," of the Finance Act, 1930. He writes as follows: "It is regretted that by an unfortunate slip the sentence referring to the reduced rate of income-tax applicable to individuals was so written as to convey the erroneous impression that, in addition to the relief in respect of the first £250 of taxable income, the personal allowance had been increased to that amount. The sentence should have read: 'Although in the case of individuals with small incomes this increase is nullified by an increase in the relief afforded in respect of the first £250 of taxable income of 2s. 6d. in the £; the effective rate of tax in such instance remaining at 2s. in the £.' The personal allowance remains unchanged at £225 for an individual whose wife is living with him."

The Annual Distribution of Prizes to successful cultivators of allotments at Crindau, employees of Newport Gas Company, took place at the Crindau Gas-Works. In the unavoidable absence of Mr. George Geen, J.P., Lieut.-Col. J. C. Rennie Brewer, J.P. (Vice-Chairman of the Company), took the Chair. He spoke of the loss they had sustained by the death of Mr. W. J. Grant, who took such an interest in the allotments, and had judged them so fairly for the long period of 35 years. The Directors had asked Mr. J. Wattie to judge the allotments in the future. Mr. Wattie stated in his report that the plots generally were clean, well planned and fully cropped. Every effort had been made to make the most of the ground, and the men were to be congratulated. The splendid efforts of the men to make what would otherwise be waste ground profitable and beautiful must be a source of great satisfaction to the Directors.

The South Yorkshire Grid Scheme for the supply of coke oven gas was discussed by the Rotherham Borough Council on Aug. 6. The Gas Committee's report stated that the whole of the gas distributed by the Rotherham Gas Department is purchased from coke ovens in the neighbourhood of the town. Objection was taken to proposals that the grid supply scheme should be controlled by a joint board, consisting of gas undertakings and coke oven concerns. The following resolution was adopted: That this Council protest most strongly against any proposal to set up a body to control the purchase and supply of coke oven gas in an area including the Rotherham gas area, as being against public policy and likely to increase the price at which the Gas Department can supply gas for industrial and domestic use in their area. The quantity of gas consumed in the Rotherham area of supply during the year ended March 31, 1930, was 627,835,000 c.ft.

The Electric Light Failed in Howarth and Sutton during the afternoon of Aug. 10 and was not made available again until nearly midnight. The system, which was taken over by the E. S. B. about a month ago, so far is utilized almost entirely for street lighting. Current has only been laid on to a few private houses in Sutton.

"Gas—Discovery, Manufacture, and Use" was the subject of an address delivered by Mr. S. B. Chandler, M.Inst.Gas E., A.M.Inst.M.E., at the weekly luncheon of the Southgate Rotary Club on Monday last. In dealing with electrical competition, he said: "There is an entire absence of acrimony, and the friendly rivalry which exists is surely of benefit to the community inasmuch as competition impels both sides continually to strive to cheapen their commodity, eliminate inefficient and wasteful methods of lighting, heating, and power, and by research, scientific application, and skill improve by all possible means service to the consumer."

The Official Opening of New Showrooms erected by the Abertillery Gas Department in the main street of the town took place on July 26. The Chairman of the Gas Committee (Councillor T. Gale), in declaring the showroom open for business, stated that the policy of the Department was service to the consumer, economy, and reliability. Despite five years of keen electrical competition the Gas Department had more than held their own, and during the financial year ended March 31, 1930, the sale of gas was increased by 3,489,000 c.ft. He complimented the Engineer and Manager (Mr. I. G. Jenkins) on the very successful way he controlled the undertaking.

A Satisfactory Agreement has been made by the Hull Corporation with the East Hull Gas Company, whereby no gas-works will be erected near the aerodrome or near the borough of Hedon. Originally it was proposed to transfer 20 acres of the aerodrome site to the Gas Company at a total cost to the city of £5000, and to this proposal the people of Hedon offered strenuous resistance. Another site was found in Great Fields Lane, so that, as the Chairman of the Aerodrome Committee (Mr. Benno Pearlman) remarked on Aug. 13, they were not parting with a single yard of the aerodrome site, and the Corporation were getting out of an awkward position. He said he appreciated the splendid way in which the Directors of the East Hull Gas Company had treated the Corporation, and he complimented the Town Clerk (Mr. Howard Roberts) on the way he had conducted the difficult negotiations.

A Curious Idea of Economy was commented upon recently at a meeting of Hinckley Urban District Council, when Mr. J. Bennett mentioned that the Hinckley Gas-Works had lost the contract for supplying coke to local schools, and that the Leicestershire Education Committee had given the whole of the contract for Leicestershire to one man who had been supplying the schools of the county. The Hinckley Gas Department had put in a price of 25s. a ton, and the contract accepted was 26s. He thought such a thing a "gross insult" to Hinckley. The governors of Hinckley Grammar School considered acceptance of such a tender very unsatisfactory, and another member of the Council added that he did not see how the Education authority were going to save by paying 1s. per ton more for coke. On the proposal of Mr. Bennett, it was decided to send a strong protest to the Education Committee, asking for a reconsideration of the matter.

Garden Produce from nearly 1400 South London allotments was represented at the Annual Fruit, Flower, and Vegetable Show, which was opened by the Rev. F. Challenor at the Co-Partnership Institute, East Greenwich, on Saturday, Aug. 9. In spite of discouraging weather conditions during the past few weeks, nearly 500 employees of the South Metropolitan Gas Company entered for the various competitions, and so excellent was the produce of competitors that the judges had a difficult task in awarding the cash prizes, amounting to nearly £50. Especially fine were the cut flower displays, and it is interesting to note that Mr. H. A. Galloway, the untiring allotment Secretary, won, for the fifth year in succession, the first prize in the section. A special division was open to all residents in the South Metropolitan Gas Company's lighting area which extends over 52 square miles; while wives and daughters of employees vied with one another in bread and cake-making competitions.

Long Service Recognition at Aldershot.

The Directors of the Aldershot Gas, Water, and District Lighting Company have decided to institute a scheme for the recognition of long and faithful service, and have asked the Co-partnership Committee to make their recommendations. This has been done, and the Directors are grateful to the Committee for having formulated a scheme acceptable to the Board without revision, and one which should commend itself to all employees.

It is felt that when a man has been twenty years in the service of the Company, he has either already given of his best, or is by then at the zenith of his usefulness. The scheme has accordingly been formulated to commence its benefits at that stage, and for every complete five years served beyond the initial twenty years, the reward will be proportionately increased. Finally, on leaving the service of the Company, every recipient of long service will receive a certificate signed by the Chairman of the Company, and countersigned by the Secretary, giving details of his service.

The scale of award will be, in respect of twenty years' continuous service, £5 per annum, and for every complete five years' additional service beyond the first twenty, an increased award of £2 10s. per annum. Gratuities will be payable only so long as the employee remains a co-partner, and will be credited each year on June 30 to the withdrawable portion of his co-partnership account. It may be, of course, that if in due time the Directors, having taken Parliamentary Powers, introduce a superannuation or pension fund, it will be necessary to revise the conditions of the long service award.

The Lighting of Liverpool.

The following is an extract from the report of the City of Liverpool Lighting Engineer's Department on the work of the Department for year ended March 31, 1930.

The total length of roads lighted at the commencement of the year amounted to 622½ miles, which increased by the end of the year to 631 miles, consequent upon the operations of the Committee. The mileage is made up as follows:

Gas	443¾ miles
Electric	186½ ,,
Oil	2 ,,

The number of public lamps increased from 27,388 to 28,010.

Owing to the increase in road traffic the need for a more scientific application of street lighting has been recognized, especially with regard to the elimination of "glare." To achieve this without depriving the roadway of the necessary illumination presented difficulties, but these were ultimately overcome by reconstructing the existing lantern and attaching to it an enamelled metal eye screen. This proved satisfactory, as not only was the glare totally eliminated, but the visibility was considerably improved. Experimental work was carried on, and it was further found that an opalescent glass eye screen in place of the enamelled metal one, while affording at least equal illumination, gave a more pleasing effect than the metal screen.

Gas Lighting.

There has been a further reduction in the number of lamps, but the gas lighting of the City has nevertheless been considerably improved. The work of substituting 4-light lamps in lieu of 2-light has been continued, 302 lamps having been dealt with.

The work of fixing 2-light in lieu of 1-light lamps has been continued, 1225 lamps having been converted. A re-arrangement of the lighting in several adopted roads has taken place, and in consequence, four 4-light, thirteen 2-light, and twenty-five 1-light lamps have been installed, while in unadopted streets and passages, 7 and 23 1-light lamps, respectively, have been erected, at the expense of the owners, &c. Although, therefore, the number of gas lamps has decreased slightly, the number of burners has grown from 24,373 to 26,107—an increase of 1734.

During the year the Liverpool Gas Company announced an extension of discounts for prompt payment to large consumers in separate buildings, the maximum being 20 p.ct., to consumers of 30,000 therms and upwards per annum. The Engineer, therefore, communicated with the Company and pointed out that in his opinion public lighting should be included in the same category as gas consumed in single buildings, and as the total annual consumption was in the neighbourhood of 850,000 therms, the maximum discount of 20 p.ct. should be allowed. After discussion, the claim was allowed, and represents a saving of over £2100 per annum, on the present consumption of approximately 912,000 therms. A sliding scale has, however, been fixed, under which the discount is reduced to 15 p.ct. if the annual consumption falls below 850,000 therms, with a further reduction of 12½ p.ct. if the annual consumption is less than 500,000 therms.

The price of gas for street lighting at the commencement of the year was 7·6d. per therm, less 12½ p.ct., or 2s. 7½d. per 1000 c.ft. This was reduced in September last to 7·4d., which, together with 20 p.ct. discount mentioned above, reduced the price to 5·92d. per therm, or 2s. 4·12d. per 1000 c.ft.

Gas Meter Testing.

The number of meters tested has increased slightly, 36,007 having been dealt with as against 35,518 the previous year. A total of 1290, or 3·5 p.ct., were rejected, and 25,504, or 70 p.ct., were of the prepayment type.

The following details as to the reasons for rejection may be of interest: Incorrect registration, 701; passing gas without registering, 133; internal leakage, 137; external leakage, 122; excessive absorption of pressure, 70; will not pass gas, 82; defective markings, 18; defective index, 16; rusty cases, &c., 11.

The gross expenditure of the Department for the twelve months amounted to £122,690, and a revenue of £11,565 has been derived principally from work performed for and material supplied to other Departments and Committees, making the net expenditure on public lighting £111,125, representing a rate of approximately 4·3d. in the £.

Gas Conquers Electricity for Street Lighting at Spenborough.

The Spenborough Council in January last considered a scheme presented by their Gas Department for the improvement of street lighting throughout the area of their gas supply and also an alternative scheme from their Electricity Department with reference to that portion of the area within which they have electricity powers.

The General Purposes Committee adopted the report of the Gas Engineer, which recommended as follows:

1. To fit all lamps in main roads and private streets with controllers at an estimated initial cost of £2231.
2. To convert all 2-light lamps on main roads to 3-light at an estimated initial cost of £207.
3. And the replacing of lamps on a portion of Bradford Road, together with the erection of additional lamps therein.

The champions of electricity, however, moved back the recommendation for further consideration, and after three Sub-Committee and Committee meetings, in all of which the gas scheme was recommended, the Council meeting passed the same at their March meeting. The champions of electricity then handed in a notice of rescission of the Council's resolution.

Further meetings took place, and after a total of two Sub-Committee meetings, five General Purposes Committee meetings, one Special Council meeting, and two Council meetings, the Council, at their July meeting, finally accepted the scheme as originally submitted by the Gas Department.

The Electricity Department are taking over 42 street lamps in Scholes, which is a small portion of Spenborough inside the area of that Council's electricity supply, but in the Bradford Corporation gas area. Electricity may hail this as a partial victory, but the scheme put forward by the Gas Department never embraced this portion when it was considered by any of the before-mentioned meetings.

The Gas Department have therefore retained all their existing street lighting and secured all the business for improving it throughout the whole of their area of supply.

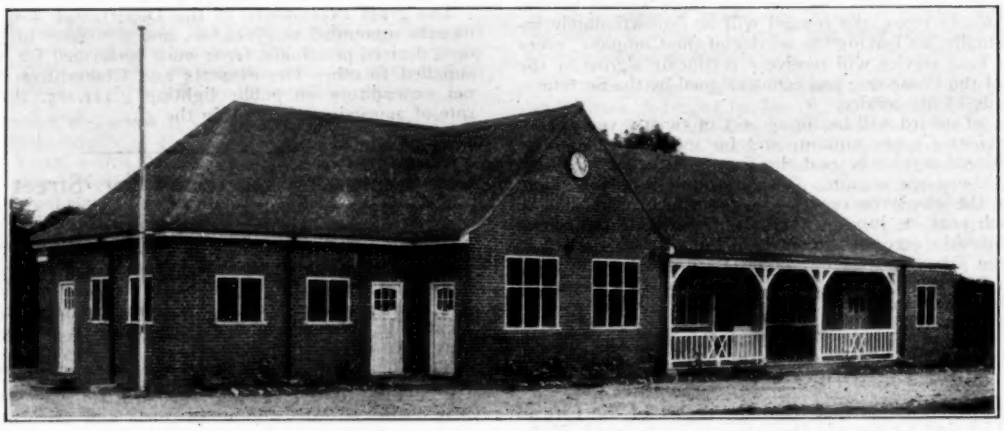
Company Results at June 30.

Harpenden.

At the annual general meeting of the Harpenden District Gas Company, which was held at the Gas-Works, Harpenden, on Aug. 13, Mr. C. Holmes Hunt, Deputy Chairman, presided in the absence of Mr. T. H. Martin (Chairman), who was indisposed. Presenting the report of the Directors and statement of accounts for the year ended June 30, 1930, the Chairman stated that the Company's sales of gas had increased by 1,430,500 c.ft., over the previous year, while, during the past twelve months, further extensions and replacement of mains had been carried out, and 214 additional consumers had been secured. In addition, 209 gas cooking stoves, 131 gas coppers, 113 gas fires and other apparatus had been fitted in the district. To provide funds for the repayment of certain debentures, to liquidate the bankers' overdraft, and to make provision for further capital, the Directors recently invited tenders for £15,000 6 p.ct. preference stock, redeemable in 1955, and the whole of that issue had been subscribed. The Revenue Account showed that the sales of gas amounted to £121 more than the previous year. The rental of meters and stoves had increased by £140, this being on account of increased business, but the receipts from coke and tar were less than the previous year. A dividend at the rate of 8 p.ct. per annum on the ordinary stock (6 p.ct. standard), *less* income-tax and subject to the interim dividend already paid, as recommended, was declared.

RAPID WATER HEATING BY GAS

An Installation which Efficiently Meets the Most Exacting Requirements.



[*Architect, B. Russell Seller, P.A.S.I.*

FIG. 1.—AN EXTERIOR VIEW OF THE PAVILION.

Among the open country of Lower Sydenham, London, S.E., is a site that has been laid out for various outdoor games, and a well-designed sports pavilion, for the staff of the Employers' Liability Assurance Corporation, Ltd. The whole provides a good example of a practice which it is pleasing to note is becoming increasingly prevalent in connection with large undertakings; but it is more particularly with the "Ella" Sports Pavilion (as it is named) that we are here concerned.

The building provides accommodation for the home and visiting teams in both summer and winter games, and has a central lounge and tea-room with verandah totalling 900 sq. ft., with service room for light refreshments adjoining. Every convenience for the members has been arranged; there being separate dressing-rooms fitted with lockers for the male members and visiting teams, each of which has a bathroom equipped with a bathing pool of white glazed bricks, 10 ft. 6 in. long by 4 ft. 6 in. wide by 21 in. deep, curtained shower baths, and range of hand-basins. The ladies' quarters are furnished with hand-basins and private slipper bath adjoining the dressing boxes.

How Hot Water is Supplied to the Baths.

There is available throughout the pavilion a copious supply of hot water on the "Victor" storage system, arranged in two sections. The pool baths, one of which is shown in the accompanying photograph (fig. 2), have each a capacity of 480 gallons. The water heating plant for these baths (fig. 3) comprises a battery of eight No. 93 "Victor" boilers, connected by

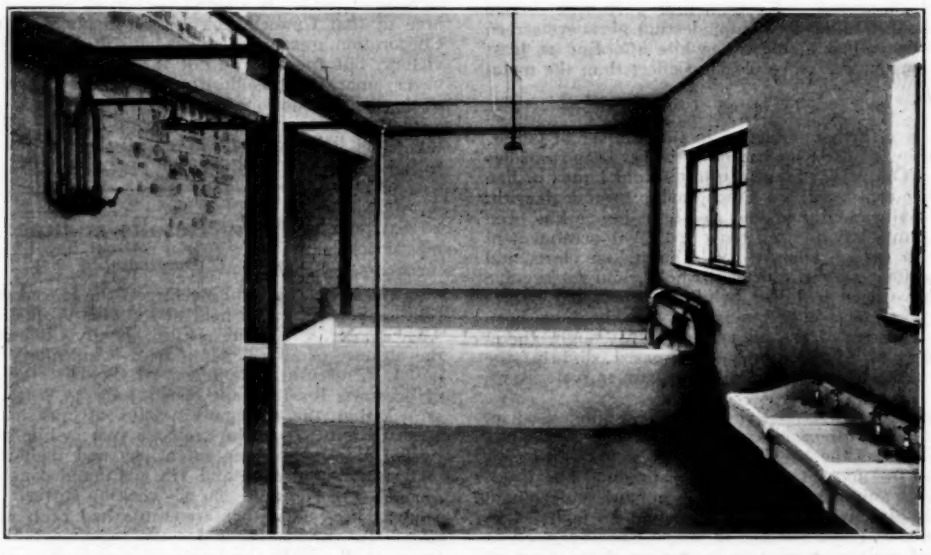


FIG. 2.—INTERIOR VIEW OF ONE OF THE BATHROOMS, WITH SHOWERS, HAND-BASINS, AND BATHING POOL.

Showing the 2½-in. main at skirting line delivering hot water to the two pools, and the covered secondary circulation above the showers feeding all other points in the ladies' and gentlemen's quarters.

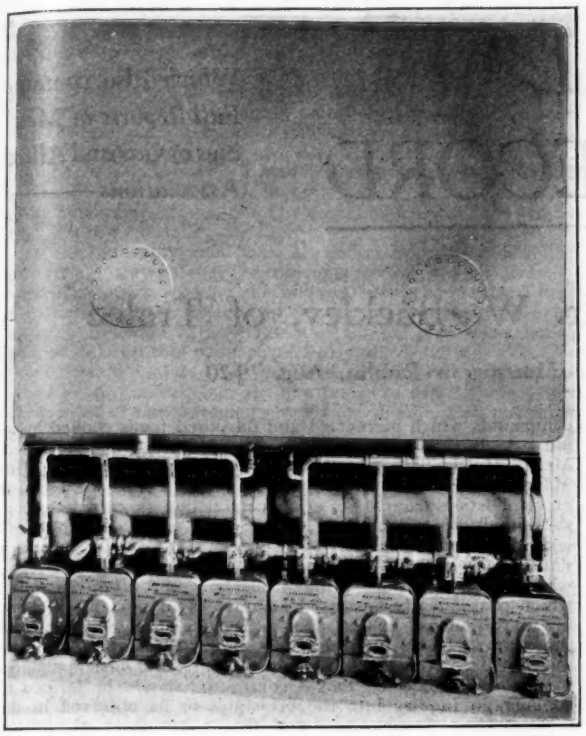


Fig. 3.—Boiler and Storage Plant provided to fill two bathing pools after various field games.

galvanized circulating pipes with 800 gallon storage in two 400 gallon galvanized ¼ in. plate tanks, totalling with the boiler contents 820 gallons. The boiler plant has an output of 246,400 B.Th.U. per hour, and running for 2 hrs. 8 min. on a test heated the contents from 70° Fahr. to 130° Fahr. (60° Fahr. rise). The consumption worked out at 1·5 c.ft. of gas per gallon of water, costing approximately 4s. 6d. for the total quantity consumed. This filled two 400 gallon baths of water at 120° Fahr. in the bath, showing an ample margin of power for the coldest winter conditions.

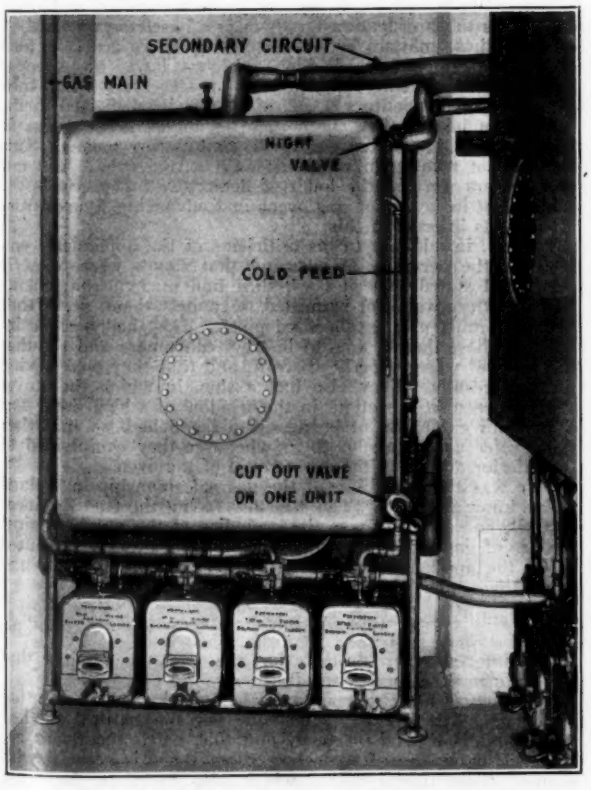


Fig. 4.—"Victor" Complete Apparatus supplying shower baths and hand-basins in the gentlemen's quarters and slipper bath and hand-basins for the ladies.

The system adopted differs in design from the standard form of circulating and storage apparatus, wherein the hot water is drawn from the top of the tanks. The purpose of the plant is to fill the two pools quickly at the close of play, and owing to the comparatively low head of water occurring in single storey structures of this type the volume of discharge would be inadequate if drawn from the top of the storage. A special design therefore has been introduced, which enables the contents of the storage tanks to be discharged rapidly into the two pools through a 2-in. valve over each bath, branched from a 2½-in. main connected to the underside of the storage. The apparatus normally stands full of water, or is filled previous to use in winter weather by the groundsman from a service taken off the cold water cistern in the roof; a 2-in. vent with branch as a warning pipe, to indicate when the storage is filled, being provided above the hot water tanks.

In cold weather, of course, the drop in temperature would be considerable if the water were allowed to stand for any length of time in the pool, and unnecessary consumption of gas would ensue. By the means adopted, however, the loss of heat, and consequently the time during which gas is being consumed, are reduced to a minimum.

Hot Water for Other Purposes.

To supply hot water for the shower baths, hand-basins, &c., there is a standard form of the "Victor" system (fig. 4), comprising a battery of four "H" Series boilers, working into a tank of 250 gallons capacity. This portion of the installation is in constant use, hot water being available at all times when members are present; but to provide for a reduced supply for winter evenings, &c., one boiler unit is equipped with a cut-out valve attachment, enabling a reserve of 20 gallons to be heated, with proportionate saving in gas. A "night" valve is also fitted in the secondary return, to stop the circulation in the long secondary flow and return pipes when the remote showers are not in demand, and the adjacent hand-basins only are required for use.

These provisions ensure the utmost economy in gas consumption, by eliminating the secondary heat losses wherever possible, and render the running cost of gas heating satisfactory in comparison with solid fuel—to say nothing of its enormous advantages from the labour-saving and flexibility points of view.

The storage tanks and circulating mains are lagged throughout with asbestos composition, surfaced in calico and coated with hard-drying varnish. In this way losses due to radiation are minimized.

The hot water installation here described has been carried out by Messrs. Thomas Potterton, Ltd., of Balham, who for so many years have specialized in work of this character; while the lighting of the building has been done by the South Suburban Gas Company, in whose area of supply the club is situated.

Notes on New Books.

A TRI-LINGUAL TECHNICAL DICTIONARY.*

This useful dictionary is divided into three sections, German-English-Italian, English-German-Italian, and Italian-German-English. It covers technical terms in general, and is not confined to any one industry. As is to be expected, a large number of words familiar in gas-works practice are to be found, and a valuable feature is the rendering of compound words and phrases into their foreign equivalents—*e.g.*, malleable-wrought iron, overhead travelling crane, run-of-mine coal, variable speed motor, &c. The author has had a wide experience of the technical literature of a large number of countries over a long period of years, and has consequently been able to include numerous words which might otherwise have been omitted. Time and again, one is at a loss to know the exact English equivalent of a foreign technical term, and must rely on a shrewd guess. With the help of this dictionary, however, doubt is turned into certainty in most cases.

It is inevitably the case in a dictionary such as this that some of the words have a somewhat unconventional appearance or rendering. Examples of this are, however, not too numerous in the present work. The volume, which has a flexible cardboard cover, is of convenient size for the pocket and will therefore serve not only as a desk-companion when foreign technical publications are being read, but will prove exceedingly helpful to engineers and fuel technologists visiting plants on the Continent or showing foreign visitors round works in this country. Legibility has, however, not been sacrificed in the desire for compactness, which latter has been achieved by the use of a thin, opaque paper. It has, therefore, been possible to employ bold type which adds very greatly to the ease of looking up words.

* Hubert Hermanns' Techno-Diktionär. Second edition; Berlin, 1929. Hubert Hermanns; pp. 411; price, 15s.

THE "JOURNAL" TECHNICAL RECORD

Which also contains Full Reports of Meetings of Gas and Allied Associations

Presidential Address of Mr. W. Buckley, of Tralee

Irish Association of Gas Managers. Meeting in Dublin, Aug. 19-20

My first duty is to thank you all earnestly for the great honour you have conferred upon me by electing me to the highest position within your gift, that of President of our Irish Association. Were I to consult my own personal wishes, my desire would be that the mantle of honour should have fallen on shoulders more capable than mine to discharge the onerous responsibilities and duties of that high office. In deference, however, to the expressed will of my colleagues, I gladly accept the post in the full consciousness that my task will be rendered light and pleasant by the cordial co-operation of each and every one of you. In a very special manner I rely on our experienced and capable Hon. Secretary, Mr. G. Airth, to make my duties all the more easy and pleasant to discharge.

It is an admitted truism that it is a foolish policy to despise an opponent, no matter how insignificant his opposition may seem. Adopting that principle, I have no intention to make light of electricity opposition and all the powers behind it. I would rather invite you to take that opposition as seriously as you may and resolve to show the world that men of your experience and business capacity are not to be disheartened or dismayed, even if all the floodgates of the Shannon were thrown open to deluge you.

Propaganda is a very useful element in the industrial as well as in the political world, and my first appeal to you is to meet propaganda with propaganda, and thus thwart the efforts of our opponents by proving that for all practical purposes our gas undertakings are capable of beating down all opposition and defying competition from any and every source in the homes of our people.

Early Days of Heating and Cooking.

The gas industry originally was simply concerned with lighting, for although the possibilities of utilizing gas for heating and cooking were recognized as early as 1804, it was not until 1825 that we find a record of its use for heating water. This was followed in 1833 by an apparatus for producing, by the combustion of gas, heated air to warm the interior of buildings.

At this time circulating heated water was acknowledged to be an excellent means of heating rooms, but the relative cost of gas against coal for heating water, which is stated at that time to have been six to one in favour of coal when the products of combustion were not allowed to escape into the open air, and twelve to one when allowed to pass directly into the atmosphere, militated against the development of this idea.

In spite of the economic difficulty, the use of gas for heating purposes steadily increased, but attention was concentrated upon the "six to one type" of appliances. In 1840 the first works was established for the manufacture of heating appliances. About this time, Mr. G. Sharp, of Southampton, constructed the first gas cooker of which we have any record. Two difficulties faced the pioneers—the doubt in the public mind as to the effect of the use of gas upon health, and the cost of appliances. Then followed a period during which improvements in the construction of stoves, particularly in the design of burners, followed in quick succession, in an endeavour to gain the favour of the public. Mr. E. Goddard, of Ipswich, in 1851, attempted to meet the second difficulty by instituting "simple hire." All these efforts, however, were unsuccessful, and manufacturers who had entered the business found it either impossible or unwise to continue it. It was not until Messrs. J. Wright & Co., in 1867, introduced a small boiling stove with an atmospheric burner that the industry re-awakened to the enormous possibilities of the sale of gas for heating purposes. Meanwhile, in 1857, the Maidstone Gas Company had successfully inaugurated a scheme for letting out stoves on simple hire, so that the stage was set for another effort on the part of the industry to popularize the use of gas for purposes other than lighting.

Overcoming Prejudice.

Public prejudice, however, proved a great stumbling block, particularly the idea that gas when burned yielded noxious compounds which permeated and flavoured foods cooked by its aid. A classic paper on this aspect of the problem is that of Mr. F. H. Hartley, given before the British Association of Gas Managers in 1872. He established the fact that the products of combustion from gas, when combustion is complete, consist simply of carbon dioxide and water vapour—both harmless. He complained of carelessness in the use of luminous flames, especially the tendency to have the flame too large, which not only smoked the oven, but very often the joint, which consequently possessed an unpleasant flavour. Following up this subject in 1878, Mr. T. Travers, of Cork, considered that the objections and prejudices of the public arose in great measure from the large number of badly designed appliances in use, and suggested that a committee should be formed to conduct an inquiry into the principles to be observed in the arrangement of apparatus, and that a premium should be offered to manufacturers for the best constructed apparatus in accordance with ascertained principles. These ideas materialized in the Gas Section of the International Gas and Electric Exhibition of 1882, when tests were conducted upon internally and externally heated ovens which showed that meat cooked in an internally heated oven with bunsen flames was superior in flavour to meat cooked in an externally heated oven. Moreover, tests showed that the average internally heated oven had nearly double the capacity of the externally heated type, and consumed only three-quarters of the gas consumed by the latter for the same work.

The Noxious Fumes "Bogey."

Externally heated ovens have never been popular, and never can be, as the justification for them is a baseless prejudice. I mention these matters because our competitors are very fond of the "noxious fumes" idea, and we have no sounder methods of disproving them than our predecessors had. Incidentally, our competitors often refer to savings effected in the cooking of joints; they claim there is not as great a loss in weight in a joint cooked electrically as by other means. This is no doubt true when compared with a coal oven. But our predecessors were in the habit of demonstrating precisely the same point in favour of gas ovens and advancing figures from actual tests in proof of this.

Travers, in addition to his criticisms of the appliances, emphasized the necessity of ensuring that stoves were properly fixed, and stated that at Cork they had made arrangements that gasfitters were not permitted to connect them, or, if they did, they must use certain sized pipes. They had a stove inspector whose duty it was to instruct consumers and see that these stoves were properly at work, and that they were giving the best results. They also had a shop in which the stoves could be seen in operation, in the window of which there was a constant exhibition of burners, good and bad, so that they could refer consumers to them whenever they complained of the inferior quality of the gas or even of the oven.

This was the beginning of the gas salesmanship in Ireland as we know it to-day. The difficulty facing the Gas Engineer of Cork 50 years ago was the prejudice of the public against the use of gas for heating and cooking, and this he attributed to (1) the appliances available, (2) carelessness in fixing and using them, and (3) the cost of gas.

Fifty Years' Progress.

It is interesting briefly to review the efforts made since that period to remove these difficulties.

(1) Progress in appliances available, particularly in heating appliances, first by the realization that the natural method of heating is by radiant heat, and that when the floors are warmed, a heating of the whole room space is secured with natural convection currents which also ventilate the room (1888).

(2) By the report of the Analytical Sanitary Commission on smoke prevention (1891-2) whose appointment was inspired by

the " Lancet " and which pointed the way to improvements in gas fire construction.

(3) The work of Thomas Fletcher and others on the design of burners and appliances.

(4) The studies of radiant efficiency of gas fires by Mr. J. H. Brearley (1907) which led to the devising of the " Leeds Radiant Efficiency " test (1910), since when makers have been in a position accurately to ascertain the radiant efficiency of their fires and to develop them better to meet this requirement.

(5) The development of a standard of hygienic efficiency for fires made practicable by the invention of the shadowgraph test of the Davis Gas Stove Company (1911) which was followed by the " Lancet " test.

(6) The realization that apart altogether from the desirability of securing the passage of products of combustion from a room, it is necessary that the air should be changed and kept in motion whatever method of heating is employed. The industry is indebted to Sir Leonard Hill for researches which have established this point beyond dispute.

Gas fires of to-day, correctly fixed, achieve not only the required heating effect, but also the requisite ventilation—a fact which most of our salesmen appreciate, though I do not think they make sufficient of the fact that our competitors make little, if any, provision for this requirement.

Turning again to cookers, very little progress was made from 1882 until the sale of gas on a heat unit basis re-directed attention to the question of the efficiency of appliances; but since 1919 many noteworthy advances have been made in the design of both the oven and hotplate. This progress received considerable impetus by the appointment of the Standardization Committee on Gas Cookers of the National Gas Council. The most noteworthy advances are the improvements which made thermostatic control practicable, a full oven with a consequent higher thermal and domestic efficiency, improved hotplate burners and grids, and the use of enamel. Our competitors can no longer speak of the " dirty " gas cooker and the difficulty of cleaning it.

Carelessness in Fixing and Using Appliances.

We are, however, still dependent upon our salesmen and fitters for guiding consumers to the right fire and for the effective conversion of coal grates, avoiding the makeshift appearance and finish which characterize poor choice and bad workmanship. The remedy is in our own hands; we must encourage and assist our salesmen and fitters to make themselves more efficient and to take advantage of the schemes of training available for them.

No matter how efficient appliances may be, the wrong fire or careless fixing may nullify all the efforts which have been made to perfect these appliances. The same remarks apply to all other appliances.

It is astonishing to reflect that Travers was so fully alive to the necessity for maintenance in order to secure the absolute satisfaction of his consumers. When I look around to-day, fifty years later, and see the number of undertakings without showrooms, efficient salesmen, and effective schemes of maintenance, I feel ashamed. We are still more or less talking about it. We need to get down to the problem and wear down the mistaken opposition of those on whom we rely to supply us with the money to inaugurate and maintain showrooms, salesmen, and maintenance staff.

The Cost of Gas.

Prejudice against the use of gas for heating and cooking has gone, but we have to fight against a State-aided competitor, electricity, which has come to the front as the result of the wonderful claims made for it and the publicity given to them. More important than the claims made is the peculiar influence which electricity has upon the minds of local authorities. When we think of electricity we instinctively think of the marvellous, and somehow the idea of up-to-dateness has become interwoven with this. So many of those who are indirectly responsible for gas undertakings gradually get the idea that anything electrical is up-to-date, that when you electrify anything you must necessarily progress, and everything else is a back number. Progress means change; but is all change progress?

It is also not unusual to hear responsible people speaking of electricity as " made from nothing." This idea is much more common than appears at first sight. The Shannon scheme appears very much in this light to many people. Water power or coal power is something, however, and the cost of its transformation into electrical power, owing to the great waste, is so high that State aid is necessary to keep up the illusion.

The test of a source of light, heat, and power, however, fortunately for us, is its efficiency in use and its cost. On neither of these points can our electrical competitors claim an advantage. The advantage is with us, as the following figures show.

Where Gas Has the Advantage.

With gas at 8d. per therm and electricity at 1d. per unit the cost of three meals for six persons per day is 2d. for gas as compared with 6d. for electricity. To equal gas in cost for cooking under ordinary working conditions electricity must be supplied at a price per unit that it not more than one 24th of the price of gas per therm. In other words:

Per Therm.		Per Unit.
With gas at 6d.	electricity must not be more than	0·25d.
" " 8d.	" " " " "	0·33d.
" " 10d.	" " " " "	0·42d.
" " 1s.	" " " " "	0·50d.

These figures are from reliable authority. Tests have proved that with similar joints equally well cooked there is the same loss of weight when the cooking is done in an electric oven as when it is done in a gas oven (the actual figures are slightly in favour of gas).

Equivalent prices per unit of electricity, with gas at 10d. per therm, proved by independent tests conducted by Mr. A. H. Barker, are:

House Warming.

Central heating	0·44d.
Open fires	0·75d.
Hot water supply	0·45d.

Cooking.

Small isolated meals cooked by coal	0·3d.
Large meals	0·425d.
Cooking for whole house, with auxiliary hotplate available	0·58d.
Entire cooking with no hotplate	0·51d.
" Electrolux " refrigerator	0·49d.

Under the Shannon scheme at Tralee, electricity for lighting and domestic purposes in private dwelling houses is charged at a fixed amount dependent on the poor law valuation of the house, plus 1d. per unit of electricity consumed. Power consumers and public institutions are charged a different fixed rate, and at 1d. per unit they are paying very much more.

Disparity Between Units.

One of the chief difficulties our salesmen have to contend with is the disparity between the units for sale of gas and electricity. We sell by therms or thousand c.ft., while electricity is sold by the Board of Trade unit. Consumers naturally get mixed up and confuse the electrical unit with ours, and very often think they are equivalent.

Take electricity at 1d. per unit and gas at 10d. per therm. Many will immediately run away with the idea that electricity is cheaper, whereas electricity at 1d. per unit actually costs almost 30d. per therm. We need well-trained salesmen to deal with points of this type.

Apart from the cost of gas we have the cost of appliances. It would be simple enough to gain converts to the use of gas for heating and cooking were it not for the cost of appliances. Our competitors are in precisely the same position, and means to be applied to get over this difficulty are common to both of us. We have the opportunity of: (1) Supplying appliances to slot consumers at a charge to be included in the price of gas; (2) the supply of appliances on simple hire; (3) the supply of appliances on hire purchase; and (4) cash sales.

The idea appears to be firmly held that an extension of use of electricity must inevitably be accompanied by the falling off in the use of gas. The following statistics for gas are taken from the Board of Trade Returns:

—	1900.	1928.	Increase.
Number of gas consumers	1,945,825	8,901,271	6,955,346
Gas sold, millions c.ft.	87,687	282,430	194,735
Miles of mains	16,748	47,153	30,405
Capital paid up	£71,414,519	£189,449,857	£118,035,338

In Great Britain in the 28 years covered by these statistics the gas industry has increased its sales by over 222 p.ct., its consumers by over 357 p.ct., its mileage of mains by 181 p.ct., and the capital by 165 p.ct. This growth has occurred without Government assistance, and the use of gas continues to increase in spite of the State-aided electrical industry.

The total output of the electrical industry in Great Britain last year was 2,215,000 therms. The output of gas was approximately five times this amount, and the gas industry, old as it is, is adding more than the total annual electricity output to its existing business every five or six years.

A Long Way to Saturation Point.

Comparison with other countries is difficult because the availability of gas throughout Europe is less than in the British Isles, where a supply is available for approximately 95 p.ct. of the population. It may appear that the number of possible consumers is nearing saturation point, but we have still a long way to go before we reach saturation in the possible consumption per head of population. In connection with this point it is interesting to turn to the United States of America, where electricity is much cheaper and gas dearer than in the British Isles.

One frequently hears the argument that when electricity in this country is as cheap as in the United States the use of gas will become obsolete. Actually in the United States the consumption of gas is much higher per head of population

than in this country. The following figures were furnished to the National Fuel and Power Committee about three years ago :

	Consumption per Head of Population.
New York	12,325
Washington	12,837
San Francisco	12,392
Chicago	10,654
Boston	9,661
London	10,100
Sheffield	9,214
Bristol	8,172
Manchester	7,690
Leeds	5,964
Newcastle	6,846

I am unable to state the consumption per head of population in the Irish towns, but the figures were given by Mr. L. W. Dalby, your Past-President.

Progress in Ireland.

Six gas-works producing over 100 million c.ft. per annum show an increase in 14 years of 51 p.ct. Works producing 50 to 100 millions in the same period had 21 p.ct. increase. Thirteen works producing from 20 to 50 million show an improvement of 13 p.ct.; fourteen smaller works from 10 to 20 million show 20 p.ct.; and fifteen works from 6 to 10 million show an increase of 5·7 p.ct. These figures prove that in spite of all difficulties the gas industry in Ireland is progressing.

The development of both gas and electricity in the United States is ahead of that in any other country, and we have considerable leeway to make up before we reach an appreciable degree of saturation in this country. In the States one does not hear the nonsense talked about gas and electricity which is all too common here. If it were true that the gas industry is fast becoming obsolete we should not find side by side with the immense development in the use of electricity in both the British Isles and the United States an even greater development in the use of gas. The output of gas in America is actually nine times the output of electricity in equivalent units, and is steadily increasing.

When I ventured to direct the attention of an electric enthusiast to these figures he remarked that we may be increasing our heating load, but we were steadily losing our lighting load.

Public Gas Lighting Increasing.

That may be so, as far as domestic lighting is concerned, but in street lighting, with the exception of districts where electricity is still very much a novelty, and its limitations are not properly understood, the gas industry is actually gaining. The following figures speak for themselves :

Year.	C.Ft.
1900	6,928,745,000
1928	10,499,430,000
Increase	3,570,685,000

The increase is 51·5 p.ct. It is encouraging to remind ourselves that many of the most important thoroughfares in London are lighted by gas, Whitehall, Parliament Square, Victoria Street, Trafalgar Square, and many others. I am also informed that 87 p.ct. of the street lighting in Berlin is by gas.

At South Shields 1752 consumers have discarded electricity and returned to gas, and 5176 have partially returned to gas lighting and are using gas for many other purposes.

It has been proved that the lighting of our streets by gas is more efficient and less expensive than by electricity, yet we find certain municipalities spending huge sums of money on electric lighting at the expense of the ratepayers.

Turning to domestic lighting, we are losing ground, but this is largely due to our own apathy and indifference to the demands of our customers. Many of us are too easily satisfied and rely too much upon the increase in the use of gas for heating and cooking to increase our sales. The convenience of electric light with its fascinating switch has created wide dissatisfaction with the inconvenience of lighting by matches, which appears primitive by comparison. I am convinced that this is one of the chief factors in the decline, and that it is from this point that we must tackle the problem.

The Distance Control Switch.

The " Newbridge " gas switch provides us with a remedy, and it possesses a great advantage over the electric switch in that a consumer may not only switch on his light from any point or series of points, but he may adjust his light to any degree from off to full on. Electric must be either full on or off. I am informed that Halifax is installing 80 of these switches every week as the result of an intensive campaign to secure the lighting load.

Many undertakings are not only consolidating their position by this means, but they are regaining lighting consumers who have changed to electricity and found the cost too great for them.

I think I have said enough to enable you to form your own conclusions as to the future. With proper attention to consumers' fittings and appliances and with good service there is no reason why we should not hold and increase our present lighting load.

I cannot let this occasion pass without thanking the representatives of the " B.C.G.A." and the National Gas Council for the great assistance I have received from them at all times. Whether one is a subscriber or not, they are always willing and delighted to assist. Everyone must admit how pleased we are to have such a body to watch over our welfare and keep us constantly supplied with the latest literature and publications. Every municipal gas undertaking in the Free State which has applied has received Government permission to become subscribers, the subscription being whatever the local authorities may think reasonable. Members who are not subscribers must not allow this privilege to slip from them, but should at once bring the matter before their boards with a view to becoming subscribers.

Conclusion.

I have no toleration for any pessimists who despair at the first obstacle and who always look on the dark side of the picture. If we take our courage in both hands and face the situation as men of grit and grim resolve we have nothing to fear for the future of our industry.

No boundary line shall ever sever the bonds of brotherhood which knit us together, for in the words of the immortal Thomas Davis :

> In fortune and name we are bound
> By links more strong than steel,
> And neither can be safe nor sound
> But in the others weal.

Sale of Coal Under Specification*

By R. A. Burrows and N. Simpkin.

It is perhaps unnecessary to-day to deal with the general consideration as regards the selling of coal on a scientific basis.

The buyer has always bought the coal that he considered best suited to his purpose, but it is only in recent years that the works engineer and the works chemist have been called in by the buyer to advise him as to the efficiency of his plant and as to the most suitable coal to use. Knowing that the buyer now sets up a standard in nearly every case, it is obviously to the advantage of the seller that the standard so established should be one to which he is a party.

Any sliding-scale contract based on one or other of the existing methods of evaluation should contain provision for bonuses as well as penalties, so that improvement in quality may be rewarded, and deterioration penalized.

One of the writers remembers 25 years ago an attempt on the part of a municipal electricity works to enter into a contract with him on a calorific valuation basis. The negotiations fell through because the buyer steadfastly refused to include in the terms of the contract any bonuses to balance the penalties that he proposed.

The argument might be advanced that the buyer is asking for a product constant in quality and therefore should not be asked to pay for better class material even if the colliery supplies it. In this case, the colliery would have to adopt the plan of mixing low-grade material with the purer product should it be found that the latter is above the standard.

The advantage to the consumer of a supply of fuel of constant quality is so obvious that it does not require further comment.

It is decidedly to the interest of any seller who conducts his business on proper lines to come to agreement with the buyer on the form of these sliding-scale contracts.

Up to a few years ago there was some point in the contention of certain old-fashioned colliery owners that the quieter they kept, the easier it was for them to get the buyer to accept coals which, to say the least of it, were not of the best quality. From the coalowners' point of view this is now all changed. Practically all buyers test their coal bought on contract. If by any chance the coal supplied is better than the sample on which the buyer made his contract nothing is said, but if it falls below the standard which has been set up by the buyer (without any reference to the seller) there is trouble.

Progress of Scientific Buying.

The progress of scientific buying has been accelerated in recent years by the growth of large combines and corporations, which, by reason of their size, have found it worth while to

* From a paper before the World Power Conference, Berlin, 1930.

establish a buying department, with a technical staff. These technical experts, acting on behalf of their company, have evolved a system of testing and evaluating all the coal received, and have formed for themselves standards by which all supplies are graded, depending upon the purpose for which the coal is required.

All large consumers, such as gas-works, power stations, and large industrial consumers, test the coal as received in order that the standards on which they buy may be maintained.

Moreover, their coal consumption is of such magnitude and their requirements of such a nature that if one colliery will not supply them with the standard and purity of coal they require they will go elsewhere. This process is tending to eliminate the coal factor or middle man who usually has very little technical knowledge of the coal he buys and sells.

As has been said, the buyer is very much in advance of the producer in this respect, and although many of the more up-to-date collieries have carried out for years the regular testing of their products, there has been no general practical relation between the collieries' test and the consumers' test.

The amalgamation of colliery companies and the formation of large combines has resulted in more technical supervision of the commercial grades of coal marketed than has previously been the case and has enabled standards of quality to be maintained more easily. It is also tending to decrease the great variety and differences in size of material.

Generally speaking, however, in the past the producer or merchant has sold his coal from day to day at a fixed price without any knowledge of the variation in quality. On the other hand, the consumer has been quick to appreciate any variation, and if this has been a deterioration he has not been slow in advising the seller. This has led to a great deal of irritation and annoyance to both the buyer and the seller, the seller never receiving credit for supplying a superior quality and having no means of checking the figures of the buyer on which his claim for an allowance was made.

The argument is sometimes advanced that coal, being so variable in quality, cannot be maintained at any fixed standard and therefore should be sold at a uniform price. This, however, is actually an argument in favour of a specification with a sliding scale of bonus and penalty, since only by such means does the price paid bear a true relationship to the value of the material supplied.

In the following table a comparison is made of the variations which may occur from week to week on the quality of colliery products. It will be observed that the ash content of the dry slack is subject to wide variation, whereas the washed, sized grade has a very much more regular ash content. The results represent the ash content of a sample taken over the whole week.

Week.	Dry Slack Ash.	Washed Grade Ash.	Week.	Dry Slack Ash.	Washed Grade Ash.
	P.Ct.	P.Ct.		P.Ct.	P.Ct.
1	13·5	5·10	14	12·4	4·35
2	15·0	4·50	15	13·1	4·70
3	16·2	4·85	16	10·6	4·20
4	16·9	4·90	17	14·2	4·60
5	15·8	5·25	18	11·3	5·00
6	14·2	4·90	19	16·4	4·60
7	..	..	20	18·1	4·80
8	16·4	4·55	21	10·9	4·35
9	14·2	4·70	22	14·8	4·55
10	14·2	4·80	23	11·7	4·00
11	14·5	4·50	24	12·2	4·45
12	14·7	4·60	25	10·6	4·35
13	14·8	4·50			

It is, of course, very difficult to maintain a regular quality in an unwashed fuel, especially small coal such as slack. Here the quality is to some extent outside the control of the producer, although much can be done by discouraging the loading of dirt with the coal, but it is obviously unfair to expect the buyer to pay the same price for a deteriorated article, even though the deterioration has occurred owing to natural causes. The ultimate remedy is, of course, to pass the coal through some type of purifying process in order to eliminate the dirt and produce a more uniform grade.

If it is decided to purchase according to a specification, the onus of drawing up the specification obviously falls in the first place upon the consumer, since he requires a coal of certain qualities to suit his particular purposes. Hence he must first have in view what might be termed a differentiating specification covering all the points which are necessary in order to exclude or include coals of any type. The terms of such a specification would, of necessity, have to be somewhat comprehensive, and it is not suggested that a specification of this type should form the basis of a contract, but should merely serve as a guide to the coal factor or producer to indicate the general type of material required.

When, as a result of experience following tests upon certain coals, the consumer decides upon one particular type, a specification to form the basis of a contract between buyer and seller can be drawn up. Such a specification may differ considerably from that mentioned above and need not as a rule be so comprehensive. It must, however, include all the necessary items in order to avoid misunderstanding. Further reference, however, will be made to this point.

Coals Bought on Performance.

It has been suggested that coals should not be bought on a specification but on their actual performance under conditions for which they are to be used—*e.g.*, a steam raising and boiler efficiency test should be performed for a coal for steam raising purposes and the price of generating a fixed quantity of steam under standard conditions determined, using different coals. It must be pointed out that the two proposals are not alternatives. A buyer would not contract, at least on a large scale, on an analysis alone, but on previous experience and on the result of practical tests on his plant. Having selected one or more coals from such tests, the specifications are drawn up and the basic standard of guarantee of the fuel fixed, preferably from the results obtained from a series of previous analyses. In this way an attempt is made to ensure the supply of a fairly standard product, by a mutual understanding between the contracting parties.

In Great Britain there has been and still is a general disinclination on the part of both buyer and seller to draw up a specification to form the basis of a contract. The reasons for this are many.

1. The system has been regarded as an unnecessary innovation tending to involve the parties concerned in a greatly increased expense owing to the work entailed in sampling and analysis.

2. The somewhat conservative attitude of both buyer and seller to the whole idea of buying and selling coal on a scientific basis.

3. It appeared that the method put unnecessary restrictions on the contracting parties.

4. The advent of the chemist in the coal industry, particularly on the productive side, has been a comparatively recent event and was regarded by some colliery owners as unnecessary. Fortunately, this attitude towards the problem is gradually being overcome. In the past there was a tendency for only those colliery owners who possessed bye-product coke ovens to employ a chemist on the productive side as well as on the coke oven plant, since the advantage of control of the coal going to the coke ovens was fully realized by the coke oven manager.

5. The whole system seemed so liable to abuse and to incorrect results being obtained that neither buyer nor seller regarded the matter favourably.

6. The old system of buying on a relatively fixed price arranged between buyer and seller had stood the test of years, and, while not without disadvantages, it operated reasonably well.

7. The setting up of the necessary arrangements for sampling and analysis, coupled with the testing of the system itself as a contract basis, seemed to entail work out of all proportion to possible results or benefits which would be obtained. Moreover, in the first place the matter could only be regarded as an experiment and, as such, would receive chiefly destructive and not constructive criticisms.

8. The discovery of a flaw in the initial stages of the operation of a contract based upon specification would tend to cause the parties concerned to revert to the old method as being simpler and better understood.

9. By the old system the buyer stood to benefit by improvements in the quality of the fuel, and would immediately complain if a deterioration took place. Hence he was not anxious for the supplier to benefit financially by such improvements.

10. The general high quality and low ash content of British coals did not necessitate any specification as to quality in the terms of a contract.

11. Another reason why the old system of selling is strongly rooted in Great Britain is that the buyer often used to obtain all his supplies from a limited number of collieries and from individuals whom he probably knew quite well.

It is impossible to brand or label coal, and therefore collieries anxious to maintain a high quality in their products are always at the mercy of intermediaries who may substitute inferior fuels, or mix lower grade fuel with the better. Hence they should welcome the assistance of the buyer in instituting periodical tests, which tend to check abuses. By performing such tests at the colliery the producer has immediately an answer to any complaints made and so protects himself from unscrupulous intermediaries or from frivolous complaints.

Unless careful records are kept of the analysis of the coal sold by a colliery, it renders the investigation of complaints very difficult and unsatisfactory, alike to the colliery proprietors, the salesman, and the buyer from whom the complaint had arisen.

The expense of sampling and testing consignments of coal is infinitesimal as compared with the value of the commodity, and the cost of carrying out such work should not deter anyone from instituting regular tests.

Coal Sold to Specification.

It does not appear impossible to the authors that at some future date all coal will be sold to a specification, and inspectors

will be appointed to test all deliveries on behalf of the buyers and seller jointly.

It should be remembered, however, that the quality of a coal can never be expected to be maintained rigidly to a standard like manufactured products, and therefore a sliding scale of prices or a suitable alternative must be a necessary concomitant of selling under specification. Especially in the case of dry slack, as has been said, it is beyond the control of the colliery manager to produce such fuel constant in quality, and the same applies in a less degree to a washed fuel.

The whole of the system of buying and selling coal to specification depends upon the results obtained from analyzing the coal. In the first place, it necessitates suitable provision being made for sampling the coal both by the supplier and the consumer, followed by the analysis of the samples obtained. For satisfactory agreement between the contracting parties the question of sampling and analysis should be thoroughly discussed before the contract is drawn up.

Reference may be made here to the vicious practice of the payment of " burning money " which in the past was made to prevent unreasonable complaints, or what was worse, to prevent reasonable complaints being made by the stokers to their employers. It is necessary that if payments which come in the first category (which may be called blackmail) are to be avoided, the sampling should preferably be done by some independent person, and according to a standard method. One of the authors has had, as a result of being absolutely set against payment of " burning money," considerable trouble at certain times with buyers, who were sometimes too lazy to investigate properly the complaints made by their stokers.

It is not within the scope of this paper to enter into details of the best methods of sampling, but it is desirable at this point to lay particular stress upon the need for the sampling arrangements to be such that the sample obtained will represent what it is intended to represent. Without this the subsequent analysis is practically valueless, while the calculation of penalty or bonus will be totally erroneous.

It would appear that the difficulties of obtaining a representative sample are not generally realized, and samples are frequently taken purporting to represent a certain consignment, while actually they do not. Again, the duty of obtaining samples is not infrequently placed in the hands of an operator who does not fully appreciate and understand what he has to do, and, however conscientious he may be, he fails in his work through lack of instruction. It is suggested, therefore, that if the actual method of sampling is not included in the terms of the contract, there should be a definite understanding between the contracting parties as to the method to be adopted.

Following upon the sampling, and assuming that a representative sample has been obtained, the methods employed for analysis should also be agreed upon. Here again it may be considered advisable to state definitely in the terms of the contract the method to be used for performing certain of the tests. Without this, and in view of the fact that no definite standard methods are recognized and adopted by all concerned, disagreement in the analytical results may readily arise due to the use of different methods. It is only necessary to cite the determination of the calorific value of the volatile matter.

Contracts based upon a specification may thus lead to subsequent disagreement if provision is not previously made for the method to be adopted for taking and analyzing the samples which are to form the regulating factor in the price of the coal.

Reference has already been made to the difference between a general specification and a specification designed to cover deliveries of coal under the terms of a definite contract. Before passing to what might be termed an ideal specification, it will be advisable to review the types of specification which have been used for the selling of coal and to criticize the points which were intended to protect both buyer and seller.

Unfortunately, there has arisen in Great Britain a somewhat misleading expression—namely, the selling of coal on a calorific value basis, which completely ignores any other qualities which it is desirable the coal should possess, and tends to imply, particularly to the uninitiated, that calorific value is the only item to be included in a specification. Very brief consideration will show that a contract drawn up with a specification embracing calorific value only is of little real value, and, moreover, is open to so many objections that it should be avoided. It might, however, be regarded as the first step in the change from the sale of coal on a fixed price basis to sale under specification. Obviously, the next step is to make the specification more comprehensive and definite, including moisture and ash figures in addition to calorific value. For one coal of certain size the calorific value varies approximately inversely as the proportion of moisture and ash, but other factors affecting the combustion of the coal also require consideration. An increase in the ash content necessitates the removal from the grate of an increased amount of residue, while, in addition, there arises the possibility of the combustion being less efficient.

The authors are not aware of any contracts based on a specification with a sliding scale of bonus and penalty operating in Great Britain for the purchase of coal for gas manufacture, coke making, or industrial purposes other than steam raising. It must not, however, be inferred that gas and coke companies do not test their coal. As pointed out in another part of the paper, the tendency has been for the buyer to purchase to his own specification at a fixed price, giving no credit for improvement in quality but complaining if the quality falls.

Analysis and Extension of Gas Sales and the Question of Tariffs

A. Schäfer (" Gas- und Wasserfach," 1930, 73, 693, July 26) describes the comprehensive investigation made by a small undertaking with a view to extending gas sales and turning unremunerative into remunerative consumers. The profitable development of gas sales involves an exhaustive analytical survey of the whole district covered by an undertaking. Such a survey is not to be made once only, but, on the contrary, should be continually in progress. The author considers in full detail, with the copious use of charts and diagrams, the conditions applying in the district of Ingolstadt, in which there are 7304 premises, of which 43 p.ct. are supplied with gas, 33 p.ct. without a supply, and 24 p.ct. beyond the area of the network. The annual sale of gas is 18 million c.ft. through 3406 meters (domestic), and 16 millions through 143 meters (industrial). Details are given of the number of dwellings with the number of rooms in each, and the gas consumption is analyzed both by district, by size of house, and by gas supplied per unit length of main in the various districts. The industrial load is analyzed into the various uses to which the gas is put. From the survey it was possible to forecast what sales would be likely to be realized by making customers in those premises which were without a supply, and what sales would be likely to be realized from the premises beyond the network, assuming that in course of time no further improvement could be effected within the area of the network, and that it would then be necessary to consider the installation of additional mains. Further objects of the survey were to ascertain why gas was not being consumed in certain premises, and the fixing of a new tariff for domestic consumers.

The results of the survey were a veritable revelation. It appeared that 703 dwellings took on an average only one farthing's worth of gas per day, and these could not be regarded as real consumers. Moreover, their consumption was mainly at peak-load periods, since the gas was used for cooking purposes. Obviously it would not pay to increase the number of consumers of this type—indeed, it would be preferable to be able to pay them something for the privilege of not being compelled to supply them with gas. On the other hand, in these cases, the use of gas is much cheaper than is the use of solid fuel, since the fuel is employed only for short periods. This very fact enables gas to be charged at a higher price and still be competitive with solid fuels. One farthing's worth of gas only represents the cost of a single briquette, and the latter cannot perform much in the way of cooking. There is thus need for a two-part tariff to render these consumers remunerative. On the other hand, higher up in the social scale, there are also consumers not taking nearly as much gas as they might reasonably be expected to take.

The rest of the paper is concerned with the fixing of a two-part tariff. Previously gas was supplied at 7s. 6d. per 1000 c.ft., with no charge for meter rent. The following tariffs were introduced:

(1) Gas, 7s. 6d. per 1000 c.ft. Meter rent, 5s. 5d. per annum (dwellings with four rooms or less), 7s. 10d. per annum (dwelling with more than four rooms).

(2) Gas at 4s. 6d. per 1000 c.ft. Service charge per annum, 13s. 3d. (one or two rooms), 19s. 8d. (three rooms), 25s. 10d. (four rooms), 32s. 5d. (five rooms), 37s. 10d. (six rooms), 44s. 6d. (seven rooms), 50s. 5d. (eight rooms).

Consumers were given the choice as to which tariff they wished to adopt. On the existing consumption, both tariffs would, in the case of all classes of dwellings, bring in a larger revenue than the old tariff. Tariff (2) would in the aggregate be more economical for the one and two roomed dwellings than tariff (1), but for larger dwellings the reverse would be the case. The low price at which gas is sold under tariff (2) affords a strong incentive to consumers to increase their consumption of gas. Curves are given showing the profit accruing to the undertaking from consumers in different classes of dwellings on the assumption that each consumer chooses the tariff most remunerative to him, and the minimum average consumption required before a profit accrues to the undertaking. The cost of gas manufacture is analyzed into fixed costs per consumer and variable costs per unit quantity of gas made.

The Use of Crude Liquor as a Fertilizer*

By K. H. RAUPP, of Görlitz.

As time goes on, it becomes more and more difficult for gas undertakings to find an outlet—profitable or otherwise—for their ammonia, whether as crude liquor, concentrate, sulphate, or chloride. Probably to-day there is not a single gas-works whose ammonia plant is not showing a debit balance. Nitrogen prices are continually falling, and the gas industry has no option but to follow them, since, by some means or other, their effluent must be rendered innocuous. The Burkheiser process has not reached a state of practical development at which it can be universally recommended, and I can see no reasonably early solution of the problem except that the gas industry should, without addition to its working costs—perhaps even at a small profit—pass its crude liquor on to agriculture.

But consideration must be given to ways and means. It will certainly not suffice to urge the agriculturists, by mere newspaper advertising, to use crude liquor. It will not suffice, either, to pass them the relevant literature of the W. V. d. G. (German Bye-Products Marketing Association). The agriculturist of to-day is no longer the simple rustic. He has at his disposal not only scientific training, but advisory associations of all kinds, especially on the subject of fertilizers. Something more is needed, and we in Görlitz have achieved this something more in actual practice, to such an extent that not so long ago the biggest and most respected farmer in the district said to me: "Certainly we will take your liquor. It is up to you to see that we can get enough of it."

The Only Question.

There remains only one doubt, which time alone can settle, and it concerns the harm which may be done by certain constituents of the liquor—sulphuretted hydrogen, cyanogen, sulphocyanides, and, above all, phenols. No such damage can be traced at any rate in the early years, but only time can prove unfounded the doubts expressed by the educated agriculturists whether the continuous use of crude liquor may not cause an eventual extermination of bacteria which are necessary to the well-being of the soil.

In a communication to "Das Gas- und Wasserfach" in 1923 (a reprint is obtainable from the W. V. d. G.) it was maintained that the small percentage of harmful constituents present could, in a suitable soil, quickly suffer oxidation, and so be rendered innocuous. In spite of this, however, proof positive is still lacking that no harm is to be expected from the destructive effect of the phenols upon the organisms which are necessary to the splitting-up process in the soil, even though, in the same report, it is shown that, for example in Rastatt and Baden-Baden, crude liquor has been supplied to the land for more than twenty years.

The Procedure in Gorlitz.

In Görlitz we began by inviting farmers, both large and small, to undertake, without expense to themselves, experiments with crude liquor, at the same time giving them the literature supplied by the W. V. d. G. The Director of a local agricultural centre was also approached, and—most important of all—a suitable plot belonging to the gas undertaking was laid out for experiment, in parallel strips, alternately unmanured and treated with liquor.

Sulphate of ammonia usually contains 20 p.ct. of nitrogen, and it is easy to work out the equivalent represented by each percentage of nitrogen per gallon of liquor in terms of weight of sulphate. The farmer can then be told that a gallon of liquor is the equivalent of such-and-such weight of the sulphate he has used previously. But it must be impressed upon him not to use it in undiluted state.

A Few Experiments.

In all the following tests, the crude liquor contained approximately 1 p.ct. of nitrogen.

First of all, meadow land was tried. With a watering can, each sq. m. was treated with 1 litre of liquor diluted with 1 litre of fresh water, so that each sq. m. received approximately 10 grammes of nitrogen (0·18 gallon of liquor and 0·18 gallon of water—*i.e.*, 130 grains of nitrogen per sq. yard). In spite of wet weather, the tips of the blades of grass all first turned grey, and so appeared to suffer damage. After only a few days, however, a strong growth set in, and the grass took on a dark green, sappy, and vigorous appearance, having about double the length of that on the unmanured patches. The first harvest, in the middle of June, gave surprising results, the crop of hay amounting to 2½ times that of the untreated crop. It should be mentioned that this particular meadow had never previously been fertilized in any way, so that it was certainly deficient in nitrogen to start with. But a noteworthy point was that a mossy growth which had been present on the land entirely disappeared on the parts which were liquor treated.

A second treatment with half the quantities of nitrogen was then made, but the second hay crop was seriously affected by a long drought. It amounted to only 45 p.ct. of the first, but in this case it was 4·3 times the weight of the crop from the untreated parts.

An interesting experiment was made on the land of a neighbouring farmer, under the supervision of the Chief of the Görlitz-Ost Agricultural Society. Three adjacent strips of meadow were taken, the first entirely unmanured, the second treated with liquor, and the third with the equivalent quantity of Leuna saltpetre. This order was repeated six times, so that, of eighteen strips, six were treated by each method. The weights of the resulting crops were respectively:

Unmanured	9·2 zentner	
Leuna saltpetre	12·7 ,,	= 1·38 times
Liquor	13·5 ,,	= 1·47 ,,

A Landowner's Opinion.

A further experience was reported to me by a farmer who wrote that to one of his small meadows he gave no manure at the beginning of the season. At the beginning of June he harvested an unsatisfactory crop of only 9 zentner (a zentner is approximately 1 cwt.) of hay. A week after the hay was in, he manured with 600 litres (about 130 gallons) of crude liquor from the Görlitz Gas-Works. He used it undiluted, and distributed it as evenly and thinly as possible. A few days later a heavy downpour set in, lasting some hours, and the working of the fertilizer became apparent very soon after this from the dark colour of the growth. The second crop at the beginning of August gave about 17 zentner of hay.

Seven Crops Tested.

Besides the meadow land already mentioned, we made tests on seven strips of land laid out parallel for field and garden crops. We kept closely to the well-approved principle stressed in one of the W. V. d. G. publications—ammonia in the soil, *not on the plants*. After thorough digging, crude liquor was again distributed by watering can—one litre, diluted with three litres of fresh water, to each square metre of surface—*i.e.*, 10 grammes of nitrogen, as before, to each square metre. The weather was dull and rainy. Corresponding strips of land were not manured in any way. A few days later, after a thorough hoeing, the manured and unmanured strips were sown with exactly equal quantities of seed, in

Mid-April:

Field I. Oats.
,, II. Black raddish.
,, III. Carrots.
,, IV. Spinach.

In the middle of May, exactly equal quantities of equal-sized seedlings were planted in

Field V. Red cabbage.
,, VI. White cabbage.

In the middle of June, again seedlings of even strength in

Field VII. Beetroot.

The Results.

Field I.—Oats.—After only a few weeks the dark green full appearance of the oats was quite striking. The manured section yielded 2·4 times as much grain, and 1·55 times as much straw as the unmanured.

Field II.—Black Raddish.—Sixty equal seeds were sown on each strip, and the seedlings appeared stronger throughout on the manured ground. The crop at the beginning of October was 3·272 kilos. from the manured section, against 2·504 kilos., or 1·3 times as great. Manured raddishes were 20 to 25 cm. long, with an average girth of 1·5 to 2 c.m. They were practically all straight in shape, and only occasionally branching, while the unmanured specimens were mostly useless for culinary purposes, owing to their branching nature (at the expense of length and thickness), the strong growth of fibrous roots, and an abundance of knobby excrescences.

Field III.—Carrots.—The manured strip here yielded 1·25

* From "Das Gas- und Wasserfach," March 8, 1930.

times the crop of the other, but it should be noted that the superior green growth of the former crop attracted more insect pests, so that results should really have been still more in its favour.

Field IV.—Spinach.—The result was striking. The manured crop was 2·5 times the other.

Field V.—Red Cabbage.—In this case there was no result to record. The crop was equally bad in each case. Only a few formed a head, the fault being probably with the plants themselves.

Field VI.—White Cabbage (from which Sauerkraut is made).—Here results were good, the manured crop being 1·6 times the other. The average weight of the heads was in about the same proportion—viz., 2·03 kilos. against 1·3 kilos.

Field VII.—Beetroot.—Although seedlings of equal strength were planted, it was a striking fact that the crop from the manured strip gave two-sixths large, three-sixths medium, and only one-sixth small beets, while the other produced one-sixth medium and five-sixths small or very small beets. The manured crop was 1·65 as large as the other.

Situation of the Gas-Works.

In no case in these tests did we aim at record crops. We set out merely to prove that, where the proximity of a gas-works makes it practicable, the use of liquor is an efficient and much cheaper substitute for the usual nitrogenous fertilizing salts.

The sale of liquor for agricultural purposes is naturally limited to the neighbourhood of the works, but where it can be done, there should be no hesitation in trying it. The situation would be eased for many undertakings if they could get rid, in this way, of most of their liquor in the nine months, September to May, even if they had to work it up in the other three.

From Loss to Profit.

We estimate, at current costs and prices, that the working-up to concentrate of our 66,000 gallons of liquor would mean a loss of £6. As a result of negotiations with the farmers, we give them liquid, diluted or undiluted, at a price of 5 pf. per 100 litres (about 20 gallons for ½d.). This is only for a start, and we can at any time double the price, without losing any business. But even if we charge only the mean price of three farthings, it brings a gain of £11 to the undertaking, against a loss of £6.

It is important to declare exactly the strength of the liquor, and the degree of dilution required, otherwise there will be trouble. I suggest that it might be offered free for six months or so in order to introduce it. Near the tap from which it is delivered there could well be a fresh water tap, so that the farmer, when he fetches his supplies, can do the diluting himself. This would save the gas-works labour and the farmer's time, and would justify the works in making an equal charge for diluted or undiluted liquor.

Gas in the Engineering Trades*

By J. E. White, of Newcastle-upon-Tyne.

During the long history of British engineering there has never been a period when the god of efficiency has been more firmly enthroned than he is to-day. Industrial gas salesmen are therefore fortunate in having a fuel to offer which is second to none in the known fuels of to-day, and which will go far to help the country through the difficult times through which it is passing. It is unfortunate that the use of more up-to-date factory equipment temporarily displaces labour, but industry requires the saving of labour for the reason that, in the long run, such savings are absorbed in trade expansion and increased production, whether in the same or in new fields.

The production of the perfect component is a matter of paramount importance. Industry demands that heat shall be applied in the most efficient manner possible, and that heat treatment shall give a degree of uniformity in the parts treated never previously asked for or attempted. It is, therefore, in the superiority of the components produced in gas furnaces that I wish to specialize in the following observations.

Gas and the Foundry Manager.

It has been said that profits can be made or lost in the core room of a foundry, and an important phase in the process is the baking or drying of cores. The core room is very often the most neglected part of a foundry, and yet improperly baked cores can cause enormous losses through defective castings. Surface faults will occur in the most perfect casting made if the core is poor, and not infrequently of such magnitude that the liberal machining allowance is quite insufficient to remove them, with the inevitable result of a scrapped casting, or, at the best, the production of a very inferior article. Such engineers as Sir W. R. Morris have realized the value of gas in this operation, and those who have seen the conveyor drying ovens in the Morris foundry will agree with the statement in one of the Morris publications that "the town gas drying of cores is considered by most British foundries to be both economical and desirable where the price of gas is at all reasonable. Once installed, labour is eliminated so far as fuel is concerned."

The highly satisfactory results gained from this type of oven will be seen from the following figures obtained in an oven engaged in the drying of cores for motor car cylinders, &c.:

Working temperature of oven . . .	350° Fahr. under automatic control
Time to complete whole operation .	2 hrs. 45 mins.
Gas consumption per lb. of product .	0·63 c.ft.
Gas consumption per ton of cores .	1400 c.ft.

When considering the old type of box drying oven it must be remembered that the burning of solid fuel is totally wrong. With it the generally accepted method is to place the cores in the oven and, after sealing up, to leave them to dry overnight. The moisture in the cores is retained in the oven, while the air, instead of circulating and carrying off the moisture, is almost stationary. This gives a core which is unduly hard on the surface, while inside considerable moisture is stored up.

One of the largest engineering firms on Tyneside has abandoned both coke and fuel oil for core drying, and now has seven ovens gas heated which dry all the cores for one of the most up-to-date brass and iron foundries in the North. It has been found that upwards of 80,000 c.ft. of gas consumed weekly is well spent money, the cores, and, in turn, the castings being greatly superior since the conversion took place.

American figures show that it is possible to dry to perfection large steel foundry cores, in ovens 7 by 7 by 6 ft. at a temperature of 650° F.; the time taken being in accordance with the size and construction of the core, and the gas consumption as low as 0·9 c.ft. per pound of product.

Metal Melting.

An enormous field is open to the industrial salesman in metal melting. It has been found that the highly efficient open-flame type furnace is somewhat unsuitable for brass melting, since the high surface temperature has a tendency to burn out certain contents of the brass. But Messrs. Armstrong Whitworth are developing an open-flame monometer furnace which is fully expected to put a different complexion on the subject of open-flame firing. Crucible furnace brass melting gives a first-grade casting. Due to even heating, the grain of the casting is good and, for the man of medium output, gas for this type of furnace leaves nothing to be desired. A gas consumption of 3·6 to 4 c.ft. per pound of brass melted is the general run with crucible furnaces.

Many of the leading aluminium foundries have found in gas the ideal fuel for the production of high-grade castings. By the use of Selas open-flame tilting furnaces there is a total absence of oxidation, and the dangers of overheating, so common in oil or solid fuel fired furnaces, are eliminated. Furthermore melting losses are less than 1·5 per cent. Guaranteed gas consumptions are available, all of which form an attractive proposition to the engineer in search of higher efficiency. Aluminium can be melted at the rate of one ton per 6700 c.ft. of gas, while lead melting can be carried out at the strikingly low figure of 800 c.ft. per ton. In an ordinary working day of 8½ hours starting with a cold furnace it is possible to melt at an average rate of 2·73 c.ft. per pound of aluminium; this, with gas at, say, 2s. 4d. per thousand, represents a cost of 0·076d. per pound. Taking into consideration the quality of the casting produced, the saving of floor space, the ease and certainty of control, and the generally improved working conditions, it would be impossible to imagine a more suitable fuel than town gas for use in the aluminium foundry.

The Nature of Various Steels.

Nickel, chromium, tungsten, vanadium, manganese, and general alloy steels are of particular interest to the forge manager, and it is well to have a general idea of the properties of each when discussing their suitability for work of varying natures for the reason that the ultimate use of the forging or stamping decides the nature of the steel and its heat treatment. Nickel steel usually contains from 3 to 3·5 per cent. nickel (ordinarily not over 5 per cent.) and from 0·20 to 0·40 per cent. carbon. This steel is used for armour plate, ammunition, bridge, and railway construction. It does not crack when perforated by a projectile. Krupp steel used for armour plate

* From a paper before the Northern Area Gas Salesmen's Circle.

contains approximately 3·5 per cent. nickel, 1·5 per cent. chromium, and 0·25 per cent. carbon. The advantages claimed for nickel steel for railway track work are its high resistance to abrasion and high elastic limit.

Chromium steel is extensively used for armour-piercing projectiles, owing to its hardness, toughness, and stiffness. It is also used in the construction of safes and for work subjected to unusually heavy stresses—rock crushing machinery is a good example.

High-chromium or "stainless" steel was originally developed for cutlery manufacture, but is now used in aircraft, motor, turbine, and pump work, because of its resistance to acids and rust, also scaling at high temperatures. Composition percentages are about as follows: carbon, 0·2 to 0·4; manganese not to exceed 0·5; phosphorus not to exceed 0·035; sulphur not to exceed 0·035; and silicon not to exceed 0·30. The chromium proportion is 11·5 to 14 per cent. The steel should be heated slowly and forged at above 950° C., and preferably between 950° and 1220°. If forged between 900° and 950° there is danger of rupturing the steel because of its hardness at red heat. Temperature control is such an important item that no other fuel but gas is suitable if first-class work is to be produced. In the Sheffield area there are many hundreds of small gas furnaces producing stainless steel table knife blades, each blade being subjected to six forging operations before completion.

Tungsten steel is seldom used in the forge but is largely employed for high-speed metal cutting tools and magnet steels. Vanadium steels ordinarily contain from 0·16 to 0·25 per cent. vanadium. The effect of vanadium is to increase tensile strength and elastic limit; it also helps the steel to meet repeated stresses in such components as springs, railway axles, and gears subjected to severe service. Manganese steel contains only 1·5 per cent. manganese, and from 0·8 to 1·25 per cent. carbon. The steel is very brittle, but can be made fairly ductible by the reverse process to that employed for carbon steel, that is, by sudden cooling.

Regarding alloy steels in general, "Vibrac" steel as manufactured by Messrs. Armstrong Whitworth is perhaps one of the finest alloy steels produced. Fool-proofness is not claimed, yet it is generally acknowledged that this particular steel stands up well under normal forging and heat treatment conditions. A good forging temperature is about 1200° C., while in the case of stampings it is recommended that, on removal from the dies, the stamping be placed in a furnace at 600°, thus obviating risk of cracks developing along the fash lines.

Forge Management.

These details may appear somewhat elaborate, but steel composition and forging furnace "condition" are so much interwoven that they must be considered jointly if we are to make our claim of perfect production hold good.

The "atmosphere" or furnace "condition" is of vital interest to the forge management. A piece of steel when heated to forging temperature is invariably covered by a layer of scale; it is in this fact that we have our strongest argument. With gas we can create at will a reducing atmosphere which cannot be obtained by any other method of heating. Metal wastage due to scale is a serious consideration, and is worth remembering when in competition with fuel oil on either drop stamping or forging. It is a perfectly accurate statement that the metal wastage with gas heating is one half of the loss with fuel oil. Solid fuel gives an even more unfavourable proportion. Unless furnace atmosphere is correct, there is a strong possibility of burning the steel. This is in addition to the usual scaling at high temperatures; furthermore, it has been found that this burning is the direct result of incorrect furnace atmosphere. The American Gas Association say that, in a gas furnace working with an atmosphere containing 6 per cent. carbon monoxide, low-carbon steel can be heated to a temperature 40° C. higher, without burning, than in an atmosphere containing free oxygen. Thus it is safer as well as cheaper to use gas. Electric furnaces are highly oxidizing, thus increasing the risk of burning the metal. It is thus very simple with gas to provide a margin of safety which should never, under normal working conditions, be fully used—a margin of 40° C. being considerable when such temperatures as 1200° are used.

In a drop stamping furnace having an output of 250 to 300 lbs. per hour the gas consumption should never exceed 3 to 4 c.ft. per pound of product in accordance with the type of stamping.

The Heat Treatment Specialist.

Great technical and commercial developments have been made in the use of gas furnaces for heat treatment during the past few years, and it is possible to turn out first-class work with almost mechanical certainty. Recent results have proved that there is no fuel more suitable than gas for such operations as annealing, hardening, tempering, carburizing, and carburizing re-heating.

The following notes on treatment procedure in carburizing may be of interest. The articles must be clean and free from oil. Having carefully inspected them, a layer of carburizer 1½ to 3 in. deep is placed in the box, then a row of the articles so arranged as to be not less than 1 in. from each other and from the walls of the box. All spaces should be filled with carburizer, and a covering layer of 1½ in. overall, all to be enclosed with freely fitting lids which are run round the edges with a luting of clay. Press the compound well down, but do not ram it hard. The box is then put into the furnace which has been previously raised to 900° C. The normal run of temperatures is from 900° to 950°; this, however, is decided by the type of work and the nature of the compound used. Temperatures in excess of 950° tend to cause flaking of the case and excessive depth; below 900° gives poor penetration, resulting in rapid wear when the components are put into service. Regarding length of period, a box 12 by 12 by 12 in. fully charged will give a case of 1-32 in. in five hours. After carburizing, the box should be withdrawn from the furnace and allowed to become quite cold. The articles are then taken out and brushed free of any adhering compound. They are then re-heated to 900°, and immediately on reaching that temperature are quenched in clean cold water. A second re-heat then takes place to 760°, and quenching in water as before.

Here is a combination of processes where the modern gas furnace can produce the almost mechanical certainty so much sought after in heat treatment shops. Even heating over the whole hearth area can be guaranteed to within 5° C., while the furnace atmosphere is such that the "life" of carburizing boxes is double that obtained by other methods of heating. This does not apply to electrical furnaces, the box life being almost the same in both cases.

Apart from the product being right, production costs are such that, where the price of gas is at all reasonable, there is little chance of any other form of fuel being adopted. Even with the high degree of efficiency obtained in electric furnaces, they are unable to produce work which is any better in quality or as cheap in cost. Comparative gas and electricity costs have been published in the "American Machinist" and other technical papers of tests carried out at the Birmingham works of the Moss Gear Company. Here, a gas and an electric furnace engaged on the same type of work produced the following results:

	Gas Furnace.	Electric Furnace.
Total gross load put through furnace during week . .	14,380 lbs.	14,703 lbs.
Total hours worked, including heating up	140	136
Average hourly consumption	367 c.ft.	20·5 KW.
Total consumption, including heating from cold . .	51,360 ,,	2780 KW.
Cost (475 B.Th.U. gas at 2s. per 1000 c.ft.)	£5 2s. 9d.	Cost at 6d. per KW.-H., £6 19s.

It is of interest to note that the costs per pound of load carburized are, in the gas furnace 0·089d., and in the electric furnace 0·113d.

A further consideration is first cost and later maintenance charges. In the case of the gas furnace £25 a year would more than cover such costs as normal wear will produce. In the electric furnace, however, such costs as element failures are bound to take place, with the result that high renewal charges may be expected. Regarding first charges, it is seldom that an electric furnace costs less than double that of a gas furnace of corresponding capacity. It is a habit of those in charge of works costs to regard all capital outlay as a chargeable expense at interest rates varying from 5 to 10 per cent. Thus a gas furnace costing, say, £500, has an advantage of from £30 to £60 annually over its electrical competitor whose first cost would be in the neighbourhood of £1100. Even with electricity at such low rates as 0·55d. and 0·6d. per unit, it is not easy to produce results which will show a saving of from £30 to £60, even when matched against gas furnaces of designs which, in the light of modern practice, must be regarded as out-of-date.

It is generally claimed that complete automatic control of furnaces can be obtained only with the electrically heated furnace. This, however, is incorrect, and it is encouraging to note that such firms as the Incandescent Heat Company, Ltd., Gibbons Bros., and the Davis Furnace Company have combined their efforts with those of instrument makers and gas undertakings in the production of automatic control for gas furnaces. This "gadget," if such it may be termed, was a much needed selling point with industrial salesmen.

Automatic Control, and a Substitute.

It is the opinion of the author that automatic control should be urged for large furnaces working over prolonged periods on such operations as carburizing. Evenness of temperature is so vital that this means of control should not be regarded as an extra. High-grade small furnaces can now be purchased at such a low price that it may be difficult to persuade a manager to go to the expense of automatic control costing, in some cases, more than the furnace itself. During the last few months, however, a small gas furnace has been supplied in the Newcastle area for night carburizing. By the fixing of a gas governor and a carefully graduated gas valve the need for automatic temperature control has been overcome.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

With the exception of the "safety-first" sections, which continued to dominate the situation, the general outlook in most markets last week was dull and uninteresting. On Friday last 5 p.ct. War Loan established a new high record, the stock changing hands at 104 1/16, and it is evident that this security is now regarded as a long-dated one.

The business done in Gas Stocks and Shares was quite satisfactory for the time of year and prices continued firm, with a general tendency to rise. There were several increases in value last week, with Maidstone 5 p.ct. heading the list with a gain of 4 points to 125 3/8. Commercial ordinary rose a further point to 95 1/2, and has now fully recovered the *ex* div. marking down of three weeks ago. There is no doubt that the working agreement between this Company and the South Metropolitan Gas Company, which now only awaits the approval of the Board of Trade, has had a strengthening influence on the Commercial Company's stock. South Suburban ordinary also gained 1 point to 101 1/2, and British 5 p.ct. debenture 1 to 92 1/2. Gas Light £1 units changed hands on Thursday last at 19s. 9d., the highest price recorded so far this year. The official quotation, however, closed on Friday last at 19s. 3d. Apart from the usual half-yearly *ex* div. reductions, the only fall in value was that of Newcastle ordinary (at the local Exchange) by 4 1/2d. per £1 unit to 16s.

Among the interim dividend announcements on ordinary capitals last week were the following: Barnet, 3 1/2 p.ct. (actual); Bournemouth original shares, 4 1/2; Bournemouth "B" maximum, 3 1/2; Brighton and Hove 6 p.ct., 3 3/4; Brighton and Hove 5 p.ct., £3 7s. 6d.; Chester, 2 1/2; Croydon sliding-scale, 3 1/2; Croydon maximum dividend, 2 1/2; East Hull, 2 1/2; Lea Bridge, 4 1/4; Liverpool, 3; Sheffield, 3 1/2; Southampton, 2 1/2; Swansea, 2 1/2. The rates in each case are the same as a year ago.

Trade Notes.

Patent Retorts for Esthonia.

The New Consolidated Gold Fields, Ltd., are erecting eight new rotary retorts of Patent Retorts design in Esthonia, after completing extensive trials on the plant in operation at Colchester.

General Refractories, Ltd.

It is gratifying to learn that despite the parlous condition of trade in the heavy industries, Messrs. General Refractories, Ltd., of Sheffield, report an increase in sales turnover for the first half of this year as compared with 1929.

Centrifugal Washers for March.

An order has been placed with Messrs. Kirkham, Hulett, & Chandler, Ltd., of Mansfield, by the March Gas-Works for one of their patent 2 ft. 6 in. centrifugal washers specially designed for the use of small gas-works for the extraction of ammonia.

"Sigma" Gas Meters.

It will be remembered that in the "JOURNAL" for Aug. 6 last there was a brief summary of a paper on this subject read at the Fifty-Third Congress of the French Gas Industry. We understand that the Licensees in the British Empire under the Sigma Meter Patents are Messrs. Parkinson & Cowan (Gas Meters), Ltd., and that this firm will shortly be putting an oil meter on the market.

Stanton-Hume Concrete Pipes.

The August stock list of Stanton-Hume concrete pipes, issued by the Stanton Ironworks Company, Ltd., near Nottingham, gives particulars of the variety and extent of concrete pipes which the firm have at present for disposal. These pipes range in diameter from 4 in. to 72 in., and are offered for immediate delivery subject to being unsold upon receipt of order.

Vitreosil Decorated Heat-Proof Gas Globes.

If you are familiar with the beauty of plain Vitreosil—pure fused quartz or silica—you will at once appreciate the rare decorative quality of these ornamented globes. Vitreosil decorated globes possess all the heat-resisting properties which make Vitreosil globes practically everlasting, and, therefore, cheap in the long run, together with the additional charm of attractive floral designs in permanent colours. They have an artistic value quite distinct from glass or opal globes. They eliminate glare, and convert the mantle's light into a flood of soft radiance, restful to the eyes and ideal for reading, sewing, or writing.

Contracts Advertised To-Day.

Gasholders.

The City of Lincoln Gas Department invite tenders for a 1 1/2 million c.ft. gasholder. [Advert. on p. 432.]

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 18.

The values of tar products remain unchanged, and are as follows: Pitch is 47s. 6d. per ton f.o.b.

Creosote for export is 6d. to 6 1/4d. per gallon f.o.b.

Pure toluole is 2s. 2d. to 2s. 3d. per gallon; 95/160 solvent naphtha, 1s. 5d. to 1s. 6d. per gallon; pure benzole, 1s. 10d. to 1s. 11d. per gallon; and pyridine bases are about 3s. 9d. per gallon; all these prices are *ex* sellers' works.

Tar Products in the Provinces.

Aug. 18.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 24s. Pitch—East Coast, 46s. f.o.b. West Coast, Manchester, Liverpool, Clyde, 46s. f.o.b.* Toluole, naked, North, 1s. 7 1/2d. to 1s. 8 1/4d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3 1/2d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3 1/2d. to 3 3/4d.; low gravity, 1 1/4d.; Scotland, 3 1/2d. to 3 3/4d. Heavy oils, in bulk, North, 5 1/2d. to 6d. Carbolic acid, 60's, 1s. 11d. to 2s. July/December. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2 1/2d. per minimum, 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Aug.* 16.

As stocks of refined tar are unusually high for the time of the year, quotations are lower. Other products are quiet with prices unchanged.

Pitch.—There are several inquiries from the Continent, but actual business is slow. Export value is nominal at 45s. to 47s. 6d. per ton f.o.b. Glasgow, while home price is about 45s. per ton f.o.r.

Refined tar to Ministry of Transport Specification is easing off, and value is lower at 3d. to 3 1/4d. per gallon f.o.r. makers' works naked.

Creosote.—The demand is limited to the better grades. B.E.S.A. Specification is 3 1/4d. to 3 3/8d. per gallon; low gravity, 3d. to 3 1/4d. per gallon; and neutral oil, 3d. to 3 1/4d. per gallon; all in bulk quantities f.o.r.

Cresylic remains inactive with quotations unchanged. Pale 97/99 p.ct. is 1s. 7d. to 1s. 8d. per gallon; dark 97/99 p.ct., 1s. 6d. to 1s. 7d. per gallon; and pale 99/100 p.ct., 1s. 9d. to 1s. 10d. per gallon; all in buyers' packages at makers' works.

Crude naphtha.—Orders are being placed at about 4 1/4d. to 4 3/8d. per gallon at makers' works in bulk.

Solvent naphtha.—Both grades are quiet with prices easy. 90/160 is about 1s. 2 1/4d. to 1s. 3 1/4d. per gallon, and 90/190, 1s. to 1s. 1d. per gallon *ex* works.

Motor benzole is unchanged at 1s. 5 3/4d. to 1s. 6 1/4d. per gallon.

Pyridines remain lifeless. 90/160 grade is nominal at 3s. to 3s. 3d. per gallon.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole . . .	0 10	to 0 11	per gallon at works
Motor ,, . . .	1 5 1/2	,, 1 6 1/2	,, ,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,, ,,

Applications for Patents.

[Extracted from the "Official Journal" for Aug. 7.]

Nos. 22,622—23,368.

ENDACOTT, E. W.—"Gas milk-scalding stove." No. 23,306.

GAS LIGHT AND COKE COMPANY.—"Concrete, &c., structures." No. 22,718.

HUMPHREYS & GLASGOW, LTD.—"Manufacture of mixed oil gas and water gas." No. 22,971.

KEITH, G. (KEITH & BLACKMAN CO., LTD., J.).—"Gas heating systems." No. 23,073.

LEE, C. B. B.—"Gas burners." No. 23,074.

PERRETT, L.—"Gas cookers." No. 22,990.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 15.	Rise or Fall on Week.	Transact'ns Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 14	5	5	Aldershot 5 p.c. max. C. .	78—78*	..	..
522,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	68—71*	−2	..
1,551,868	,,	Apl. 3	7½	7½	Alliance & Dublin Ord. . .	92—95	..	94½–94⅝
374,000	,,	July 10	4	4	Do. 4 p.c. Deb. . .	60—63	..	..
522,655	,,	Mar. 6	7	7	Barnet Ord. 7 p.c.	109—112	..	..
300,000	1	Apl. 24	1/4⅛	1/7⅛	Bombay, Ltd.	16/-—18/-	..	16/3—16/6
174,500	10	Aug. 14	9	9	Bournemouth 5 p.c.	13⅜—14⅜*	−¼	14⅛
500,050	10	,,	7	7	Do. B 7 p.c. . . .	12—12½*	−¼	12⅜
439,160	10	,,	6	6	Do. Pref. 6 p.c. .	10¼—11*	−¼	..
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb. .	54—57	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb. .	72—75	..	..
357,900	,,	Mar. 20	7½	7½	Brighton & Hove 6 p.c. Con.	115—120	..	..
871,880	,,	,,	6¾	6¾	Do. 5 p.c. Con.	102—105	..	103
1,287,500	,,	July 24	5	5	Bristol 5 p.c. max.	88—89*a*	..	..
855,000	,,	Apl. 3	7	8	British Ord.	110—116	..	112
100,000	,,	June 26	7	7	Do. 7 p.c. Pref.	112—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. . .	70—73	..	..
450 000	,,	,,	5	5	Do. 5 p.c. Red. Deb. . .	91—94	+1	..
100,000	,,	June 26	5	5	Cambridges5 p.c. Deb. . .	93—96	..	95½
100,000	10	May 22	6	10	Cape Town, Ltd.	9—10	..	..
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref. . .	6½—7½	..	..
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. . .	69—74	..	..
626,860	,,	July 24	6	6	Cardiff Con. Ord.	94—97	..	..
287,860	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb. .	97—100	..	..
157,150	,,	Aug. 14	6¾	5	Chester 5 p.c. Ord.	86—91*b*•	−2	..
98,936	1	May 8	†2/-	†2/-	Colombo, Ltd. Ord. . . .	33/—35/-	..	..
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. . .	18/6—20/6	..	..
375,402	1	Apl. 3	1/9⅜	1/9⅜	Colonial Gas Assn. Ld. Ord	17/—19/-	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	19/—21/-	..	..
2,073,280	Stk.	July 24	7	6	Commercial Ord.	94—97	+1	95—96
475,000	,,	June 26	3	3	Do. 3 p.c. Deb. . .	56—59	..	..
787,560	,,	Aug. 14	7	7	Croydon sliding scale . .	103—106*	−2	103—104
453,100	,,	,,	5	5	Do. max. div. . . .	81—84*	−2	84—85
542,270	,,	Mar. 6	7	10	Derby Con.	115—125*e*	..	..
55,000	,,	June 26	4	4	Do. Deb.	65—70*e*	..	..
209,000	,,	Mar. 6	5	5	East Hull Ord. 5 p.c. . . .	71—73	..	71½
1,002,180	,,	Mar. 20	†4*g*	†7*g*	European, Ltd.	105—115	..	..
18,829,125	,,	July 24	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	19/—19/6*f*	..	19/—19/9
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. . . .	62—64	..	63⅞
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref. . .	77—80	..	78—79
5,602,620	,,	June 26	3	3	Do. 3 p.c. Con. Deb. . .	58—61	..	60 61
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. . .	97—100	..	99½
161,460	,,	Feb. 20	10	10	Harrogate Cons. 10 p.c. max.	158—163	..	..
82,500	,,	Mar. 20	7	7	Hastings & St. L. 5 p.c. Conv.	99—104	..	..
258,740	,,	,,	5½	5½	Do. 3½p.c. Conv.	78—83	..	79½
70,000	10	May 22	†10	‡	Hongkong & China, Ltd. .	13½—14½	..	13⅝—14
213,200	Stk.	Aug. 14	6	6	Hornsey Con. 3½ p.c. . . .	88—91*	−2	..
2,436,594	,,	May 22	10	25	Imperial Continental Cap. .	350—370	..	355—361½
223,130	,,	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	80—85*	..	..
235,242	,,	Aug. 14	8½	8½	Lea Bridge 5 p.c. Ord. . .	123—128*	..	..
2,145,907	,,	Aug. 14	6	6	Liverpool 5 p.c. Ord. . . .	90¼—91¼*b*•	−2½	..
600,000	,,	Mar. 20	7	7	Do. 7 p.c. Red. Pref. .	100—102*b*	..	..
165,736	,,	Feb. 20	9	8	Maidstone 5 p.c. Cap. . .	123—128	+4	125
63,480	,,	June 26	3	3	Do. 3 p.c. Deb. . .	51—54	..	..
75,000	5	June 26	†10	†10	Malta & Mediterranean . .	5¼—6	..	..
392,000	—	Apl. 1	5½	5½	Metrop'itan (of Melbourne) 5¼ p.c. Red. Deb. . . .	90—93	..	..
541,920	Stk.	May 22	†6	†8	Montevideo, Ltd.	105—110	..	..
2,061,315	,,	July 24	5⅜	5	Newcastle & Gateshead Con.	15/9—16/3*d*	-/4½	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref. .	70½—71½*d*	.	..
691,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb. .	66⅜—67⅜*d*	..	..
169,940	,,	Mar. 6	7½	7½	North Middlesex 6 p.c. Con.	109—114	..	..
396,160	,,	Aug. 14	5	5	Northampton 5 p.c. max. .	76—81*	−2	..
300,000	,,	Apl. 24	9	7	Oriental, Ltd.	108—113	..	111—112
60,000	5	13 My., '15	—	—	Ottoman	0—¼	..	..
205,162	Stk.	June 26	8	8	Plym'th & Stonehouse 5 p.c.	105—108	..	..
424,416	,,	Feb. 26	8	8	Portsm'th Con. Stk. 4 p.c. Std	110—115	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max. . .	78—81	..	..
186,000	100	June 2	4	4	Primitiva 4 p.c. Red. Deb. .	96—99	..	..
677,837	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	79—82	..	..
371,496	,,	June 26	4	4	Do. 4 p.c. Cons. Deb. .	81—84	..	..
150,000	10	Apl. 3	6	6	San Paulo 6 p.c. Pref. . .	8½—9	..	..
1,736,968	Stk.	Mar. 20	6½	6½	Sheffield Cons.	103—105*e*	..	..
95,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—78*e*	..	..
90,000	10	June 5	‡4	‡5	South African	4—6	..	5½—5⅝
6 709.895	Stk.	Aug. 14	7½	5	South Met. Ord.	101—103*	−1	101½—104
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	107—110*	−2	110
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb. . .	57—60	..	58⅜—59½
734,000	,,	Mar. 6	6½	6½	Do. 6½ p.c. Red. Db.	99—101	..	..
91,500	,,	Aug. 14	8½	8½	South Shields Con. . . .	103—104*d*•	−3½	..
1,543,795	,,	July 24	6½	6½	South Suburban Ord. 5 p.c.	100—103	+1	..
468,837	,,	June 26	5	5	Do. 5 p.c. Deb.	93—96	..	96
647,740	,,	Feb. 20	5	5	Southampton Ord. 5 p.c.max.	76—79	..	..
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	71—74	..	..
179,014	,,	July 24	8	8	Sutton Ord.	110—113	..	..
67,828	,,	June 26	5	5	Do. 5 p.c. Deb. . . .	93—96	..	..
250,000	,,	Mar. 6	7	7	Swansea 7 p.c. Red. Pref. .	98—101	..	..
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb. .	98—101	..	..
1,076,490	,,	July 24	6⅝	6⅝	Tottenham District Ord. .	102—106	..	103⅜
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. . .	95—98	..	..
199,065	,,	June 26	4	4	Do. 4 p.c. Deb. . .	73—76	..	..
182,880	10	30 Dec., '12	—	—	Tuscan, Ltd.	3¾—4¾	..	..
85,701	Stk.	Mar. 20	6	6	Do. 6 p.c. Red. Deb.	75—80	..	..
309,094	,,	Mar. 6	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	94—99	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref. . .	85—90	..	..
1,180,970	,,	July 10	—	7	Wandsworth, Wimbledon, and Epsom Cons. . .	107—112	..	109—109½
200,000	,,	,,	5	5	Do. 5 p.c. Pref.	87—90	..	..
488,344	,,	June 26	5	5	Do. 5 p.c. Deb.	95—98	..	97

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. *g.*—Paid on £10 shares. • Ex. div. † Paid free of income-tax. ‡ For year. § Div=10 p.ct. p.a. less tax and less tax on interim dividend.

(This announcement is inserted gratuitously.)

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With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun and on occasions—be it admitted—of naughtiness.

Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception.

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There is a long waiting list of "Peters" throughout the British Isles, for whom training and accommodation must be provided in the immediate future.

Will you help with a donation or annual subscription? Any sum, large or small, will be gratefully received.

Here's a suggestion. Your eyesight is worth 3d. a year to you. Send Peter and his handicapped pals 3d. for every year you've had it. Now, please, in case it slips your memory. Good idea!

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THE 12 POINTS OF SALESMANSHIP. By Herbert N. Casson. No. VI.—Mention the Price Last.

THE SHOWROOM WINDOW MONTH BY MONTH. By E. Lee.

TEN MINUTE TALKS ON GAS APPLIANCES. By " Thermix." The Cooker Hotplate.

THE PSYCHOLOGY OF MANAGEMENT. By F. H. Sherriff, F.I.A. No. VII.—Working Conditions.

" THE PROMISE OF THE FUTURE " AND THE PERFORMANCE OF THE PRESENT. By " Observer."

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Plans for Next Session.
The Southern District Sub-Section " B " Discuss Hot Water Systems.
South Wales and Monmouthshire Circle—New Officers.
Southern District Sub-Section " B " Meet at Chichester.
Industrial Gas Appliances. By P. Hopkinson.
Gas and the Modern Engineer. By Joseph E. White.
Salesmanship as Seen from the Rental Counter. By W. D. Walker, F.I.A.C.
Advertising. By W. R. Moffatt.
Electrical Fusion of Gas Pipes. By H. C. Widlake, A.M.I.E.E.

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CONTENTS

EDITORIAL NOTES.

A GLANCE AT THE CONTENTS . . . 459
The Irish Meeting 460
Coal Prices and Gas Charges 460
A Matter of Policy 460
Publicity, and Showrooms 461
Benzole from Continuous Verticals . . . 461
Hygienic Heating: And Ventilation by Gas—The Unremunerative Consumer—Another Example—A Remunerative Consumer—The Unemployment Problem 462
An Innovation in Gas Education—The "Westchester Bus"—Home Service Departments 463

Personal 463
Obituary 463
Forthcoming Engagements 463

THE NEWS OF THE WEEK.

Walton-on-Thames and Weybridge Gas Company—The "N.B." Golf Circle—Peterborough Gas Company—South Suburban Gas Company—Largest Benzole Recovery Plant—A Petition at Glasgow—Objections to Overhead Electric Lines—A Pigeon Nests in a Gasholder—The Illingworth Carbonisation Company—Objection to New Gasholder 464

THE NEWS OF THE WEEK—(*continued*).

Blending with the Skyline 464
The South Yorkshire Gas Grid 464
Collin Ovens for Pont Brûlé 465
Chefs Enjoy Cookery Demonstration . . . 465
Company Results at June 30 465

Handling Coke Efficiently 466
The Coal Mines Act, 1930 468
From the "JOURNAL" in the Early 'Fifties . 469

THE "JOURNAL" TECHNICAL RECORD.

Irish Association of Gas Managers—
Presidential Address of Mr. W. J. Buckley 470
General Business 470
A Talk About Ourselves. By F. J. Edmonds 471
National Gas Council (Irish District Board)—
General Business 475
Address by Mr. E. J. Fottrell 475
Work of the "B.C.G.A." during the Year. By J. C. Walker 476
Influence of Size of Coal During Gas Manufacture 477
Possible Improvements in the Gas Industry . . 477
Continental Notes 478
The Composition of Benzole from Gas Manufactured in Vertical Retorts. By W. A. Voss 479

REGISTER OF PATENTS.

Scrubbers—Watson, S. G., Henshaw, D. M., and W. C. Holmes & Co., Ltd. 481
Transporting Systems—Humphreys & Glasgow, Ltd., and Fryer, J. E. G. 481
Cookers—Peterson, S. W. 481
Effecting Contact Between Gases and Divided Solids—Humphreys & Glasgow, Ltd. . . 481
Gas-Fired Furnaces—Wellman Smith Owen Engineering Corporation, Ltd., and Soward, H. W. 481
Gas-Fired Incinerators—Robinson, J. C., and James Slater & Co. (Engineers), Ltd. . . 481
Applications for Patents 481

GAS MARKETS AND MANUFACTURES.

Stock Market Report 482
Coal Markets 482
Contracts Advertised To-Day 482
Trade Notes 482
Current Sales of Gas Products 482

Gas Acts (1920 and 1929) Orders 482
Stock and Share List 483

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For Advertisers' Index—see p. 489.

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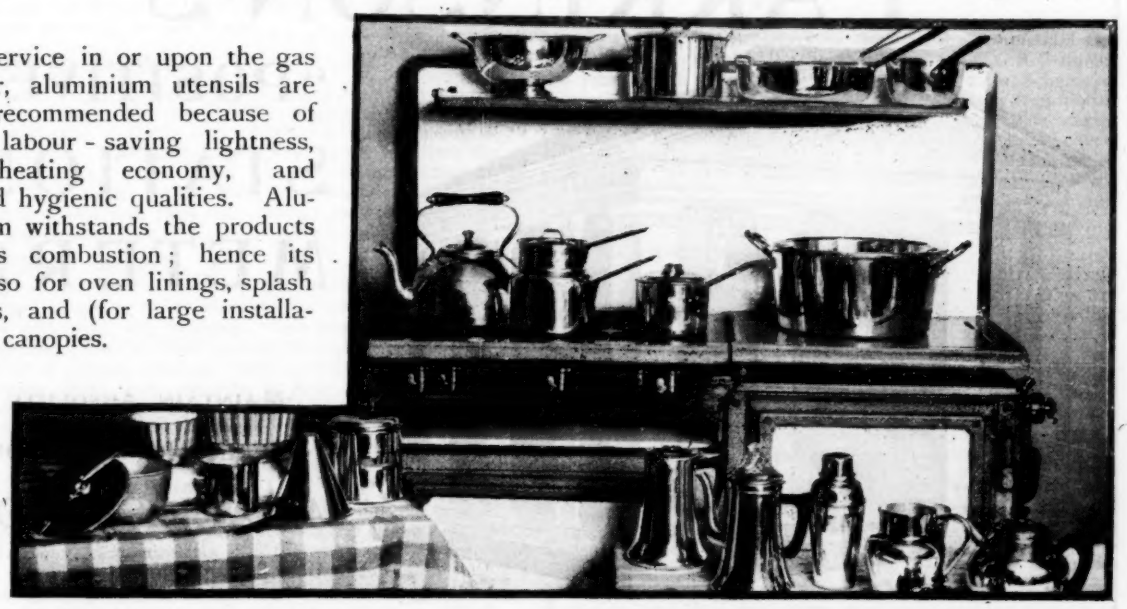

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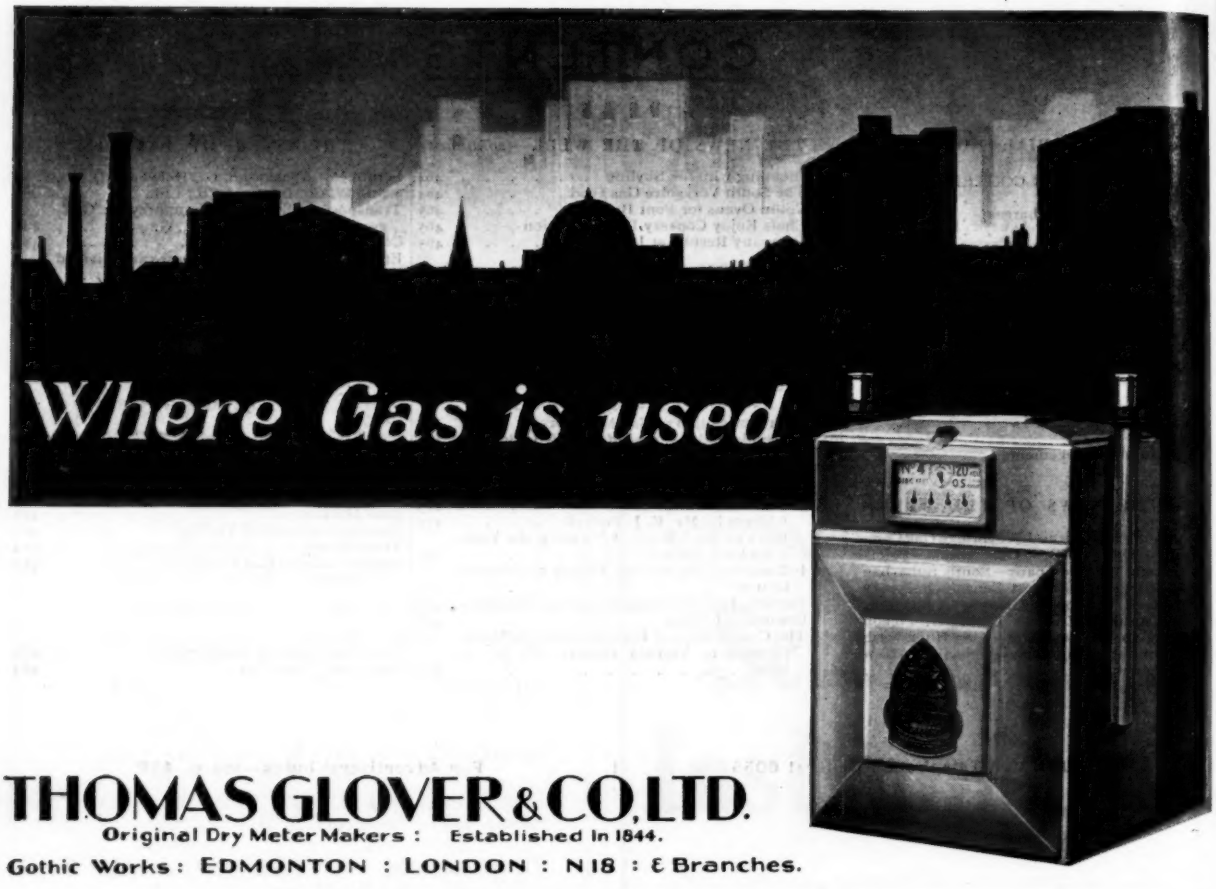

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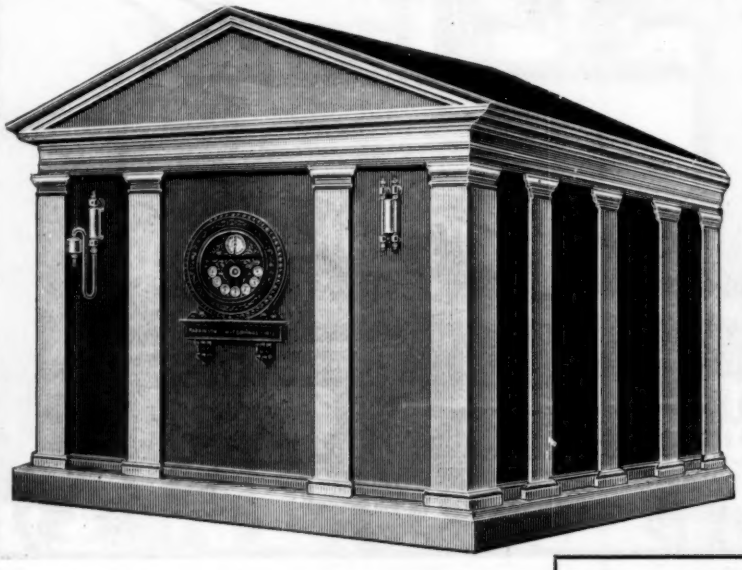

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